United States, the Commonwealth of Massachusetts and Connecticut v. The General Electric Company (D. Mass.)
Consent Decree
APPENDIX D

**Protection Agency**

nd Restoration
One Congress Street, Suite 1100, Boston, Massachusetts 02114-2023

**Enforcement-Sensitive Information Attached**

**Memorandum**

**Date:** August 4, 1999

**Subject:** Request for Removal Actions Outside the River at the GE–Housatonic River Site, Pittsfield, Massachusetts–**Action Memorandum**

**From:** Richard Cavagnero, GE Project Leader
Office of Site Remediation and Restoration

**Through:** Patricia L. Meaney, Director
Office of Site Remediation and Restoration

**To:** John P. DeVillars
Regional Administrator

## I. Purpose

The purpose of this Action Memorandum is to request and document approval for the proposed removal actions described herein for the GE–Housatonic River Site (the "Site"), Pittsfield, Massachusetts. The proposed removal actions will mitigate the human health and environmental threats posed by the existing levels of polychlorinated biphenyls ("PCBs") and other hazardous substances at the following areas of the Site:

The GE Plant Area, which is further divided into the following:

- The 20s Complex
- The 30s Complex
- The 40s Complex
- East Street Area 2 – South
- East Street Area 2 – North
- East Street Area 1 – North
- Hill 78 Consolidation Area
- Building 71 Consolidation Area
- Hill 78 – Remainder
- Unkamet Brook Area

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The Former Oxbows Area, which is further divided into the following:

- Former Oxbows A and C
- Lyman Street Area
- Newell Street Area I
- Newell Street Area II
- Former Oxbows J and K

The Housatonic River Floodplain, which is further divided into the following:

- Floodplain Current Residential Properties Adjacent to the 1 ½-Mile Reach – Actual/Potential Lawns
- Floodplain Non-Residential Properties Adjacent to the 1 ½-Mile Reach – (Excluding Banks)
- Floodplain Residential Properties Downstream of the Confluence – Actual/Potential Lawns

and,

The Silver Lake Area.

With regard to removal actions to address groundwater and non-aqueous phase liquid ("NAPL") contamination, the areas referenced above have been grouped into the following groundwater management areas (GMAs):

GMA #1

Plant Site 1 - which consists of the 20s Complex, the 30s Complex, the 40s Complex, East Street Area 2 - South, East Street Area 2 - North, East Street Area 1 - North, East Street Area 1 - South, the Lyman Street Area, Newell Street Area I, Newell Street Area II, and the Silver Lake Area.

GMA #2

Former Oxbows J and K

GMA #3

Plant Site 2 - which consists of the Unkamet Brook Area, excluding the portion west of Plastics Avenue (See section II.A.3.b of this Action Memorandum).

GMA #4

Plant Site 3 - which consists of the Hill 78 Consolidation Area, the Building 71 Consolidation Area, Hill 78 Area - Remainder, and the portion of the Unkamet Brook Area to the west of Plastics Avenue.

GMA #5

Former Oxbows A and C

**Consent Decree**

This Action Memorandum has been prepared for removal actions to be performed by the General Electric Company ("GE") pursuant to a final Consent Decree. Currently, a Consent Decree has been or will be lodged in U.S. District Court, United States, et al. v. General Electric Company (D.Mass.) ("Consent Decree"). The Consent Decree memorializes an agreement to address releases and threats of releases of hazardous substances from GE's facility in Pittsfield, Massachusetts, including, but not limited to, the releases and threats of releases of hazardous substances addressed in this Action Memorandum. Following lodging of the Consent Decree, this Action Memorandum, the Consent Decree, and other documents related to the Consent Decree, are subject to a period allowing for public comment. A public comment period has already been held from May 6, 1999 through June 5, 1999 for the proposed on-site consolidation of excavated soils from the Allendale School Property and the excavated sediments and soils from the Upper ½-Mile Reach, as defined in the Consent Decree. EPA's consideration of and response to the comments received are included with the Consent Decree lodged with the Court.

For the removal actions proposed in this Action Memorandum, if, following the period for public comment, the Consent Decree is entered by the Court and made effective, the findings and determinations of this Action Memorandum will also become effective at that time (with the exception that the findings and determinations regarding the on-site consolidation of excavated soils from the Allendale School Property and the excavated sediments and soils from the ½-Mile Upper Reach, as defined in the Consent Decree, will become effective upon lodging of the Consent Decree). However, if following the public comment period, the Consent Decree is not entered by the Court and made effective, then the findings and determinations of this Action Memorandum (with the exception of the on-site consolidation of excavated soils from the Allendale School Property and excavated sediments and soils from the Upper ½-Mile Reach, as defined in the Consent Decree) will not become effective, this Action Memorandum shall have no force or effect, and EPA reserves the right to issue subsequent Action Memoranda regarding the removal actions addressed herein.

# II. Site Conditions and Background

**CERCLIS ID #:** MAD002084093
**Site ID #:** 0167

## A. Site Description

### *1. Site History*

GE has operated a large-scale industrial facility in Pittsfield, Massachusetts since the early 1900s. The primary industrial activities at the Pittsfield facility included manufacturing and servicing of power transformers, defense and aerospace (ordnance), and plastics. Currently, GE's World Headquarters for Plastics is located at this facility, the defense and aerospace division was sold (General Dynamics Corporation is currently operating in the defense and aerospace portion of the former GE complex), and the transformer division is closed.

Although GE performed many functions at the Pittsfield facility throughout the years, the activities of the Transformer Division were one likely source of PCB contamination. Briefly, GE's Transformer Division's activities included the construction and repair of electrical transformers utilizing dielectric fluids, some of which contained PCBs (primarily Aroclors 1254 and 1260). GE manufactured and serviced electrical transformers containing PCBs at this facility from approximately 1932 through 1977.

During the late 1930s/early 1940s, approximately one and one-half miles of the Housatonic River was straightened and channelized to reduce flooding. This action resulted in eleven oxbows being isolated from the River channel. Some of these oxbows were filled with material from GE later found to contain PCBs (Administrative Record Document # ("AR Doc. #") 15), as well as material from other sources.

The Site has been the subject of numerous Federal and State investigations dating back to 1981. The investigations were ultimately consolidated under two regulatory mechanisms: Two Administrative Consent Orders (the "ACOs") executed on May 22, 1990 and July 2, 1990 with the Massachusetts Department of Environmental Protection ("DEP") pursuant to the Massachusetts Contingency Plan, and a Corrective Action Permit issued by EPA pursuant to the Resource Conservation and Recovery Act ("RCRA").

On February 8, 1991, EPA issued a RCRA Corrective Action Permit (the "Permit") to the General Electric-Pittsfield Facility. The Permit established a process and a schedule for the assessment and remediation of releases of hazardous wastes at, and from, the GE facility. GE and others appealed the Permit, and it was subsequently modified and reissued effective January 3, 1994. The areas incorporated into the Permit include the 254-acre GE facility, Silver Lake, the

Housatonic River and its floodplain, adjacent wetlands and all sediments contaminated by PCBs migrating from the GE facility. The Permit specifically addresses seven study areas: Unkamet Brook (US EPA Area 1), The Hill 78 Landfill (US EPA Area 2), East Street Area I (US EPA Area 3), East Street Area II (US EPA Area 4), GE Lyman Street Parking Lot (US EPA Area 5A), Newell Street Parking Lot (Newell Street II )(US EPA Area 5B), and the Housatonic River and Silver Lake (US EPA Area 6).

The two ACOs between GE and the Massachusetts DEP became effective in May and July 1990, respectively. The ACOs cover all the study areas in the EPA Corrective Action Permit (located in Massachusetts) and three additional study areas: Newell Street Area I; the Former Housatonic River Oxbows; and Allendale School. In 1997, "off-site" properties that received contaminated fill from GE also became subject to investigations and cleanup under the ACOs. These off-site properties are not subject to this Action Memorandum.

GE has performed numerous actions and investigations under the EPA RCRA Corrective Action Permit and/or the ACOs. The results of these actions and investigations are available in numerous documents, reports, letters, data packages, and other submittals to EPA and the Massachusetts DEP. Many of these submittals are part of the Administrative Record for this Action Memorandum.

On December 18, 1996, pursuant to Section 106 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended ("CERCLA"), 42 U.S.C. § 9606, EPA issued GE a Unilateral Administrative Order ("UAO") requiring the excavation of heavily contaminated riverbank soils and sediments from 550-foot stretch of the Housatonic River adjacent to Building 68 (AR Doc. # 16).

On September 25, 1997, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9606, EPA proposed the Site for inclusion onto the National Priorities List (NPL). The Site has received a Hazard Ranking System score of 70.71.

In October 1997, EPA, in combination with the United States Department of Justice, the Commonwealth of Massachusetts, the State of Connecticut, the City of Pittsfield and State (both Massachusetts and Connecticut) and Federal Natural Resource Trustees, formed an intergovernmental team and, with the assistance of a mediator, initiated negotiations with GE. In April 1998, negotiations were terminated without an agreement.

On May 26, 1998, EPA Region I's Director of the Office of Site Remediation and Restoration issued a Combined Action and Engineering Evaluation/Cost Analysis ("EE/CA") Approval Memorandum documenting the need for a removal action in the area of the Site covering approximately two miles of the Housatonic River, riverbanks and floodplains from the Newell Street Bridge to the confluence of the East and West Branches of the Housatonic River.

The Combined Action and EE/CA Approval Memorandum specified certain source control actions and riverbank and sediment excavation activities in the approximate ½-mile from Newell to Lyman Street (the "Upper ½-Mile Reach") (AR Doc. # 24).

The Combined Action and EE/CA Approval Memorandum also authorized EPA to conduct an EE/CA to determine the appropriate removal action activities for the next 1 ½ miles from Lyman Street to the confluence of the East and West Branches of the Housatonic River (the "1 ½-Mile Reach").

Also, in June 1998, negotiations between the intergovernmental team and GE resumed. In September 1998, the parties reached an agreement-in-principle that included a comprehensive cleanup of the Site, the redevelopment of portions of the GE facility, and a settlement of Natural Resource Damages claims.

On July 12, 1999, EPA Region I's Regional Administrator issued an Action Memorandum documenting the need for a removal action at the Allendale School Property area of the Site. GE is currently implementing the required actions specified by Allendale School Property Action Memorandum (AR Doc. # 30).

### *2. Removal Site Evaluation*

The Removal Site Evaluation consisted of a review of the existing reports submitted by GE, the results of sampling events conducted by EPA, and information gathered by EPA personnel during numerous site visits conducted over the past several years. A brief description of the areas of the Site subject to the proposed removal actions and a summary of the contamination is presented in Section 3.

### *3. Physical Location and Site Characteristics*

The Site consists of the 254-acre GE facility; the Housatonic River, riverbanks, and associated floodplains beginning at the Newell Street bridge in Pittsfield, Massachusetts, and extending downstream to the extent of contamination; former river oxbows in Pittsfield that have been filled (including commercial properties located at and adjacent to these former oxbows); Allendale School; Silver Lake (a 26-acre Commonwealth of Massachusetts designated Great Pond) and its associated banks; and Unkamet Brook and its associated floodplain.

The Site, excluding the downstream portion of the Housatonic River and floodplains, is located in a densely populated area of Pittsfield consisting of industrial, commercial, recreational and residential properties.

Contamination is present at the Site in soils, sediments, surface water, groundwater and in NAPL. The areas where removal actions are to occur are further described below. Removal actions to address soil, sediment and/or surface water contamination are proposed for each area described in Section 3.a. In addition, removal actions for groundwater/NAPL contamination are proposed for certain areas of the Site referred to as groundwater management areas, which are further described below in Section 3.b.

**a. Soil, Sediment, and Surface Water Removal Action Areas**

**The GE Plant Area**

The GE Plant Area consists of the following areas: the 20s Complex, the 30s Complex, the 40s Complex, East Street Area 2 – South, East Street Area 2 – North, East Street Area 1 – North, Hill 78 Consolidation Area, Building 71 Consolidation Area, Hill 78 – Remainder, and the Unkamet Brook Area.

**The 20s Complex** - This approximately 15-acre area is located immediately east of the 30s Complex within the western portion of the GE facility, and is generally bounded by East Street to the south and other areas of the GE facility to the north and east. Current conditions within this area are predominantly characterized by the existing asphalt parking areas. Previously, these areas were associated with most of the 20s Complex buildings which were razed in the late 1980s. At this time, only two buildings remain in this area.

Limited sampling has been performed in this area. Levels of PCBs as high as 3 parts per million (ppm) have been detected in unpaved surficial soils and levels of PCBs as high as 12 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. # 7).

**The 30s Complex** - This approximately 20-acre area is located south the 40s Complex, and is generally bounded by Silver Lake Boulevard to the west, East Street to the south, and other areas of the GE facility to the south and east. The surface of this area is generally comprised of asphalt/concrete, some unpaved areas, and several existing buildings. [This area of the facility is a component of the re-development agreement between GE and the City of Pittsfield.]

Levels of PCBs as high as 27 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 120 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. # 7).

**The 40s Complex** - This approximately 9-acre area is located within the western portion of GE's Pittsfield facility and is generally bounded by Kellogg Street to the north, other areas of the GE facility to the south and east, and non-GE-owned commercial/industrial areas to the west. Currently, Buildings 42, 43, 43-A, and 44 comprise nearly one-half of this area (eastern portion)

while the remainder is mostly paved (asphalt/concrete). Previously, Buildings 40-B, 41, and 41-A comprised much of the western portion of this area; these buildings were demolished in the early 1990s, although the subgrade portions of these buildings remain within this area.

Levels of PCBs as high as 120 ppm have been detected in unpaved surficial soils (AR Doc. # 3).

**East Street Area 2 - South** - This area comprises approximately 50 acres of the western portion of the GE facility. It is generally bounded by East Street to the north, Newell Street to the east, the Housatonic River to the south, and the Lyman Street Area to the west. The western portion of this area is comprised mostly of the 60s Complex, and is otherwise mostly paved. The eastern portion of this area contains a former Housatonic River oxbow that was formed when the river meandered through this area. The area is currently characterized as mostly open areas with a relatively small wooded area located south of the former oxbow.

For the removal action proposed for this area, the soil response requirements in this Action Memorandum are applicable to the non-riverbank portion of the area. The soil response requirements for the riverbank portion adjacent to this area will be subject to the removal action associated with the Upper ½-Mile Reach, as described in the Consent Decree and EPA's May 26, 1998 Action Memorandum. The riverbank portion of this area will also be subject to proposed groundwater/NAPL response actions specified in this Action Memorandum as well as source control response actions conducted pursuant to EPA's May 26, 1998 Action Memorandum.

Levels of PCBs as high as 7,111 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 53,307 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. # 3).

**East Street Area 2 - North** - This approximately 50-acre area is also located within the western portion of the GE facility. It is currently covered mostly with buildings and pavement. However, several relatively small grassy areas are present within the eastern portion of this area. The area is generally bounded by Tyler Street to the north, New York Avenue to the east, Woodlawn Avenue and the 40s Complex to the west, and Merrill Road, the 20s Complex, and East Street Area 1 to the south.

Levels of PCBs as high as 970 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 14,000 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. #s 4 and 13).

**East Street Area 1 - North** -This approximately 5-acre area is located immediately south of East Street Area 2 - North and east of the 20s Complex. This area is mostly unpaved, and is generally bounded by Merrill Road to the north and west, East Street to the south, and a non-GE owned commercial area to the east. The area also includes the area currently occupied by a commercial-

use building (of which GE owns a portion), and a relatively small unpaved GE-owned property south of East Street, which contains an oil/groundwater recovery system.

Levels of PCBs as high as 13 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 7.8 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. # 13).

It should be noted that the area between this area and the Housatonic River, designated as East Street Area 1 - South, is included in the overall GMA that encompasses this part of the GE Plant Area, and groundwater and NAPL in that area will be addressed in accordance with the Consent Decree and the Statement of Work for Removal Actions Outside the River and its attachments (the "SOW"), which is an appendix to the Consent Decree. However, soil-related issues in East Street Area 1 - South will not be investigated or remediated pursuant to this Consent Decree and the SOW, but rather pursuant to a revised Administrative Consent Order to be executed by GE and the Massachusetts DEP.

**Hill 78 Consolidation Area** - This approximately 6-acre area currently rises approximately 15 feet above grade, and is located near the center of the GE facility. This area includes the former Hill 78 landfill, which was originally created in the early 1940s as an on-site disposal area for excavated soils generated within the GE facility and was capped in 1991 with a geotextile layer and either one foot of crushed stone or soil. This area is designated for use as an on-plant consolidation area for certain materials excavated or otherwise removed as part of removal actions specified by this Action Memorandum, the Allendale School Property Removal Action specified by EPA's July 12, 1999 Action Memorandum, the Upper ½-Mile Reach Removal Action specified by EPA's May 26, 1998 Action Memorandum, or for the removal action for the 1 ½-Mile Reach of the Housatonic River, for which EPA is currently conducting an EE/CA.

Levels of PCBs as high as 47,385 ppm have been detected below the geotextile and stone/soil cover material (AR Doc. # 17).

**Building 71 Consolidation Area** - This approximately 5-acre area is also located within the central portion of the GE facility. It is located immediately to the east of the Hill 78 Consolidation Area. With the exception of Building 71, this area is unpaved and generally bounded by paved parking areas to the north and east, by the Hill 78 Consolidation Area to the west, and the U.S. Generating Company facility to the south. This area is designated for use as an on-plant consolidation area for certain materials excavated or otherwise removed as part of removal actions specified by this Action Memorandum, the Allendale School Property Removal Action specified by EPA's July 12, 1999 Action Memorandum, the Upper ½-Mile Reach Removal Action specified by EPA's May 26, 1998 Action Memorandum, or for the removal action for the 1 ½-Mile Reach of the Housatonic River, for which EPA is currently conducting an EE/CA.

Levels of PCBs as high as 663 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 2,430 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. # 17).

**Hill 78 Area - Remainder** - The remaining portion of the Hill 78 Area comprises approximately 60 acres of the GE facility. This area is generally bounded by Tyler Street Extension to the north, Merrill Road to the south, New York Avenue and other areas of the GE facility to the west, and other areas of the GE facility to the east. With the exception of paved roadways associated with Building 78 and the U.S. Generating Company's cogeneration facility, the remaining areas of the Hill 78 Area are generally open. A small portion of this area (on the northeast corner of New York Avenue and Merrill Road) may also be used an on-site consolidation area.

Levels of PCBs as high as 840 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 18,741 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. # 17).

**Unkamet Brook Area** - This approximately 140-acre area consists of the eastern portion of the GE facility and is bounded by Dalton Avenue to the north, Plastics Avenue and the Hill 78 Area - Remainder to the west, Merrill Road to the south, and to the east by railroad tracks. This area also consists of commercial/recreational property located between Merrill Road and the Housatonic River to the south. It includes the Brook, which is a tributary to the Housatonic River, and its riparian wetlands. The GE-owned portion of this area located west of Unkamet Brook is mostly paved and covered with large buildings. The GE-owned portion of this area east of Unkamet Brook, as well as much of the land between Merrill Road and the Housatonic River, is undeveloped (except for the area associated with Building OP-3 and the commercial area along Merrill Road).

Levels of PCBs as high as 1,100 ppm have been detected in unpaved surficial soils. Levels of PCBs as high as 430 ppm have been detected in the Unkamet Brook sediments, PCBs as high as 1,400 ppm have been detected in the banks of Unkamet Brook, and levels of PCBs as high as 19 ppm have been detected in floodplain soils (10-year floodplain) (AR Doc. #s 5 and 26).

Non-PCB hazardous substances have been detected in the top 15 feet in soils at the GE Plant Area in concentrations as high as the following: chlorobenzene (2.2 ppm), benzene (130 ppm), toluene (400 ppm), xylene (59 ppm), trichloroethene (8,000 ppm), tetrachloroethene (20,000 ppm), 1,3-dichlorobenzene (14 ppm), 1-4, dichlorobenzene (13 ppm), 1,2,4-trichlorobenzene (9.4 ppm), 1,1,1-trichloroethane (1,100 ppm), benzo(a)anthracene (4,500 ppm), benzo(a)pyrene (4,000 ppm), benzo(b)fluoranthene (4,200 ppm), benzo(k)fluoranthene (4,200 ppm), chrysene (4,100 ppm), dibenzo(a,h)anthracene (25 ppm), indeno(1,2,3-cd) pyrene (240 ppm), napthalene (79,000 ppm), phenanthrene (33,000 ppm), pyrene (16,000 ppm), lead (34,000 ppm), copper

(4,930 ppm), cadmium (19.3 ppm), chromium (8,810 ppm), and dioxin (0.12 ppb—2,3,7,8-tetrachlorodibenzodioxin) (AR Doc. #s 3, 4, 7 and 17).

**The Former Oxbows Area**

The Former Oxbows Area consists of the following areas: Former Oxbow Areas A and C, the Lyman Street Area, Newell Street Area I, Newell Street Area II, and Oxbows J and K.

**Former Oxbow Areas A and C** - Former Oxbow Area A is approximately 5 acres in size and occupies a large open field on the south side of the Housatonic River north of Elm Street and Newell Street. The majority of this area is undeveloped and covered with grass and low brush, although commercial businesses occupy a portion of the parcel containing the former oxbows. Former Oxbow Area C is approximately 2 acres in size and located immediately east of Former Oxbow A, along the south side of the Housatonic River, near the end of Day Street. This area consists mostly of an undeveloped field surrounded by trees and brush.

For the removal action proposed for this area, the soil response requirements in this Action Memorandum are applicable to the non-riverbank portion of the area. The soil response requirements for the riverbank portion adjacent to this area will be subject to the removal action associated for the 1 ½-Mile Reach, as described in the Consent Decree and EPA's May 26, 1998 Action Memorandum. The riverbank portion of this area will also be subject to proposed groundwater/NAPL response actions specified in this Action Memorandum.

Soil samples have been collected from three soil boring locations in the Oxbow A Area. PCBs were detected in the subsurface soils (below two feet) in all three soil borings with a maximum concentration of 50 ppm at the 8 to 10 foot depth. The maximum concentration of PCBs found in surficial soils (0 - 2 foot depth) was 25 ppm. At Oxbow C, soil samples were collected from 3 soil boring locations and 8 surficial soil sampling locations. A maximum PCB concentration of 750 ppm was detected in surficial soil (0 - 2 foot depth). In deeper soil, a maximum PCB concentration of 57 ppm was detected at the 12 - 14 foot depth and 150 ppm at the 14 - 16 foot depth (AR Doc. # 10). In 1997, due to the presence of PCBs at concentrations greater than 10 ppm in surficial soils within 500 feet of a residence, GE conducted an Immediate Response Action in this area. GE excavated surficial soil in grassy areas where PCBs exceeded 30 ppm and in vegetated area where PCBs exceeded 50 ppm. Approximately 130 cubic yards of soil was removed from the grassy areas, with approximately 6 inches of soil removed from a total of 7,200 square feet. Approximately 160 cubic yards of soil was removed from vegetated areas, with approximately 6 inches of soil removed over a total area of 8,400 square feet (AR Doc. # 20).

Non-PCB hazardous substances have been detected in the top 15 feet in soils in this area in concentrations as high as the following: benzo(a)anthracene (24 ppm), benzo(a)pyrene (22 ppm),

benzo(b)fluoranthene (49 ppm), benzo(k)fluoranthene (49 ppm), chrysene (22 ppm), dibenzo(a,h)anthracene (3.6 ppm), indeno(1,2,3-cd) pyrene (13 ppm), napthalene (23 ppm), phenanthrene (59 ppm), pyrene (43 ppm), lead (104 ppm), copper (287 ppm), and chromium (9.1 ppm) (AR Doc. # 10).

**Lyman Street Area**

This approximately 9-acre area is located immediately west of East Street Area 2 - South and is generally bounded by the Housatonic River to the south, East Street and several commercial/residential properties to the north, and Cove Street to the west. Approximately 3 acres of this area is composed of the GE-owned Lyman Street Parking Lot, which is paved. The remaining GE-owned portions of this area are partially paved and undeveloped. The non-GE-owned portions of this area consist of an undeveloped right of way for high tension electricity transmission lines (containing Former Oxbow Area E) and Former Oxbow Area B. Former Oxbow Area B is approximately 3 acres in size and located north of and across the Housatonic River from Oxbow C, west of Lyman Street, and immediately east of Cove Street. Nearly all of this area is used for parking in support of local commercial businesses, although a commercial use building occupies a small portion of this area. The remaining portions are undeveloped.

For the removal action proposed for this area, the soil response requirements in this Action Memorandum are applicable to the non-riverbank portion of the area. The soil response requirements for the riverbank portion adjacent to this area will be subject to the removal action associated with the Upper ½-Mile Reach and the 1 ½-Mile Reach, as described in the Consent Decree and EPA's May 26, 1998 Action Memorandum. The riverbank portion of this area will also be subject to proposed groundwater/NAPL response actions specified in this Action Memorandum as well as source control response actions conducted pursuant to EPA's May 26, 1998 Action Memorandum.

At Oxbow B, soil samples were collected from 2 soil boring locations and 5 surface soil sampling locations. PCB concentrations in the surficial soil samples range from 3.5 ppm to a maximum of 180 ppm. PCBs were also detected in subsurface soil samples, with a maximum concentration of 49 ppm at the 4 - 6 foot depth and 17 ppm at the 10 - 12 foot depth (AR Doc. # 10).

At the Lyman Street Parking Lot/undeveloped right-of-way section, levels of PCBs as high as 100 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 290,000 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. #s 2 and 12).

Non-PCB hazardous substances have been detected in the top 15 feet in soils in the Lyman Street Area in concentrations as high as the following: carbon tetrachloride (4.6 ppm), chlorobenzene (37 ppm), benzene (0.41 ppm), toluene (0.82 ppm), xylene (20 ppm), trichloroethene (9.8 ppm),

tetrachloroethene (0.2 ppm), 1,3-dichlorobenzene (32 ppm), 1-4, dichlorobenzene (220 ppm), 1,2,4-trichlorobenzene (300 ppm), cis-1,2-dichloroethene (0.18 ppm), benzo(a)anthracene (18 ppm), benzo(a)pyrene (21 ppm), benzo(b)fluoranthene (26 ppm), benzo(k)fluoranthene (12 ppm), chrysene (21ppm), dibenzo(a,h)anthracene (1.6 ppm), indeno(1,2,3-cd) pyrene (5.7 ppm), napthalene (91 ppm), phenanthrene (110 ppm), pyrene (80 ppm), lead (14,400 ppm), copper (4,650 ppm), cadmium (5.4 ppm), chromium (204 ppm), and dioxin (0.06 ppb—2,3,7,8-tetrachlorodibenzodioxin) (AR Doc. #s 2 and 12).

**Newell Street Area I**

This approximately 11-acre area is generally composed of 10 commercial/industrial properties and three recreational properties located along Newell Street. This area is bounded by the Housatonic River to the north, Newell Street to the south, the Hibbard School playground to the east (including the northwest corner of that playground within this area), and Ontario Street Extension and the GE-owned Newell Street Parking Lot to the west.

For the removal action proposed for this area, the soil response requirements in this Action Memorandum are applicable to the non-riverbank portion of the area. The soil response requirements for the riverbank portion adjacent to this area will be subject to the removal action associated with the Upper ½-Mile Reach, as described in the Consent Decree and EPA's May 26, 1998 Action Memorandum. The riverbank portion of this area will also be subject to proposed groundwater/NAPL response actions specified in this Action Memorandum.

Levels of PCBs as high as 29,900 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 290,000 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. # 1).

Due to the presence of elevated levels of PCBs in the soil in this area, GE has conducted a number of Short-Term Measures/Immediate Response Actions at certain properties in this area, including soil removals, installation of caps, and installation of access restrictions. These actions were taken pursuant to the applicable State ACO and under the supervision and approval of the Massachusetts DEP.

Non-PCB hazardous substances have been detected in the top 15 feet in soils in this area in concentrations as high as the following: lead (8,150 ppm), copper (4,180 ppm), cadmium (13.4 ppm), and chromium (525 ppm) (AR Doc. # 1).

**Newell Street Area II**

This approximately 8-acre area is located immediately west of Newell Street Area I and is generally bounded by the Housatonic River to the north, Newell Street and residential property to

the south, and Sackett Street to the west. Approximately 3 acres of this area is composed of the GE-owned Newell Street Parking Lot, which is paved. The remaining GE-owned portions of this area are wooded. The non-GE-owned portions of this area consist of an undeveloped right of way for high tension electricity transmission lines, and undeveloped private, non-residential property.

For the removal action proposed for this area, the soil response requirements in this Action Memorandum are applicable to the non-riverbank portion of the area. The soil response requirements for the riverbank portion adjacent to this area will be subject to the removal action associated with the Upper ½-Mile Reach, as described in the Consent Decree and EPA's May 26, 1998 Action Memorandum. The riverbank portion of this area will also be subject to proposed groundwater/NAPL response actions specified in this Action Memorandum as well as source control response actions conducted pursuant to EPA's May 26, 1998 Action Memorandum.

Levels of PCBs as high as 16,000 ppm have been detected in unpaved surficial soils and levels of PCBs as high as 80,000 ppm have been detected in subsurface soils (1 to 15 foot depth) (AR Doc. #11).

GE has installed fencing in this area, as Immediate Response Actions under EPA and DEP supervision, to restrict access to the areas with high PCB concentrations in unpaved surface soil.

Non-PCB hazardous substances have been detected in the top 15 feet in soils in this area in concentrations as high as the following: chlorobenzene (16 ppm), benzene (0.45 ppm), xylene (1.6 ppm), vinyl chloride (0.031 ppm), trichloroethene (170 ppm), 1,3-dichlorobenzene ( 6.5 ppm), 1-4, dichlorobenzene (44 ppm), 1,2,4-trichlorobenzene (210 ppm), cis-1,2-dichloroethene (130 ppm), benzo(a)anthracene (7.4 ppm), benzo(a)pyrene (25 ppm), benzo(b)fluoranthene (45 ppm), benzo(k)fluoranthene (45 ppm), chrysene (42 ppm), dibenzo(a,h)anthracene (4.8 ppm), indeno(1,2,3-cd) pyrene (14 ppm), napthalene (12 ppm), phenanthrene (110 ppm), pyrene (71 ppm), lead (12,000 ppm), copper (11,000 ppm), cadmium (18 ppm), chromium (210 ppm), and dioxin (0.064 ppb—2,3,7,8-tetrachlorodibenzodioxin) (AR Doc. #s 11 and 27).

**Former Oxbows Areas J and K** - These areas are located approximately 2,500 feet upstream of the Newell Street bridge. Former Oxbow J measures approximately 4 acres in size, and is located on the north side of the Housatonic River near Fasce Place. Former Oxbow K occupies approximately one acre and is located on the south side of the Housatonic River across from Former Oxbow Area J near Ventura Avenue. While Former Oxbow Area K is undeveloped, Former Oxbow Area J is composed of residential property to the west and commercial property to the north along East Street. For this area, the requirements of this Action Memorandum apply to both the riverbank and non-riverbank portions of the former oxbow areas.

Limited sampling has been performed in these two former oxbows, and they are not well characterized. In the ~~limited sampling~~, surficial soil sampling has detected PCBs in surface soil in levels as high as 13 ppm. Non-PCB hazardous substances have been detected in the top 15 feet in soils in this area in concentrations as high as the following: benzo(a)anthracene ( 8.1 ppm), benzo(a)pyrene (5.6 ppm), benzo(b)fluoranthene (5 ppm), benzo(k)fluoranthene (4.2 ppm), chrysene (5.8 ppm), dibenzo(a,h)anthracene (0.73 ppm), indeno(1,2,3-cd) pyrene (3 ppm), napthalene (1.2 ppm), phenanthrene (17 ppm), pyrene (13 ppm), lead (195 ppm), copper (95.6 ppm), chromium (41 ppm), and dioxin (0.00055 ppb—2,3,7,8-tetrachlorodibenzodioxin) (AR Doc. #10).

**The Housatonic River Floodplain Area**

The Housatonic River Floodplain Area consists of the following areas: Floodplain Current Residential Properties Adjacent to the 1 ½-Mile Reach – Actual/Potential Lawns; Floodplain Non-Residential Properties Adjacent to the 1 ½-Mile Reach – (Excluding Banks); and Floodplain Residential Properties Downstream of the Confluence – Actual/Potential Lawns.

**Floodplain Current Residential Properties Adjacent to the 1-1/2 Mile Reach - Actual/Potential Lawns** - The 1 ½-Mile Reach is bounded by Lyman Street to the north and the confluence of the East and West Branches of the Housatonic River to the south and is bordered by properties within the floodplain that are contaminated with PCBs greater than 2 ppm.

A determination that a removal action was appropriate in this area is documented in the May 26, 1998, Combined Action and EE/CA Approval Memorandum for the Upper Reach of the Housatonic River. The May 26, 1998 Combined Action and EE/CA Approval Memorandum contains a further description this area and information on the contamination present.

This area includes the Actual/Potential Lawns (as defined in the Consent Decree) of approximately 33 residential properties adjacent to the 1 ½-Mile Reach. Excluded from this area are the portions of these residential properties that are not Actual/Potential Lawns (which will be addressed as part of a separate removal action for the 1 ½-Mile Reach of the Housatonic River, as described in the Consent Decree).

**Floodplain Non-Residential Properties Adjacent to the 1 ½-Mile Reach – (Excluding Banks)** - As noted above, the 1 ½-Mile Reach is bounded by Lyman Street to the north and the confluence of the East and West Branches of the Housatonic River to the south and is bordered by properties within the floodplain that are contaminated with PCBs greater than 2 ppm (including Fred Garner Park).

As also noted above, a determination that a removal action was appropriate in this area is documented in the May 26, 1998, Combined Action and EE/CA Approval Memorandum for the

Upper Reach of the Housatonic River. The May 26, 1998 Combined Action and EE/CA Approval Memorandum contains a further description this area and information on the contamination present.

This area includes the non-bank portions of approximately 13 non-residential properties adjacent to the 1 ½-Mile Reach. Excluded from this area are those properties associated with Former Oxbow Areas A and C and the Lyman Street Area, as well as the bank portions of the other non-residential properties (which will be addressed as part of a separate removal action for the 1 ½-Mile Reach of the Housatonic River, as described in the Consent Decree).

**Floodplain Residential Properties Downstream of the Confluence – Actual/Potential Lawns**

This area begins at the confluence of the East and West Branches of the Housatonic River and extends in a downriver direction. This area includes the Actual/Potential Lawns (as defined in the Consent Decree) of the following residential properties where such areas are located within the floodplain: approximately 11 residential properties between the confluence and Woods Pond Dam, and any other residential properties downstream of Woods Pond Dam with Actual/Potential Lawns present in the floodplain that are found to contain PCBs greater than 2 ppm.

Levels of PCBs as high as 70 ppm have been detected in surficial soils and levels of PCBs as high as 129 ppm have been detected in subsurface soils on at least one property in this area (AR Doc. # 25).

As discussed below (see Section II.B. Other Actions to Date), GE has conducted Short-Term Measures/Immediate Response Actions, including the removal and replacement of contaminated soil, at portions of several residential properties in the Housatonic River floodplain (both adjacent to the 1 ½-Mile Reach and downstream of the confluence) under EPA and DEP oversight and approval.

**The Silver Lake Area**

The Silver Lake Area is located immediately to the west of and across Silver Lake Boulevard from the 30s Complex and includes the lake and its banks. Silver Lake has a surface area of approximately 26 acres and a maximum depth of about 30 feet. It receives stormwater contributions from several municipal outfalls, a portion of the GE Plant Area (via NPDES-permitted outfalls), and a number of non-GE-owned properties (both commercial and residential). Silver Lake is hydraulically connected to the Housatonic River by a 48-inch diameter concrete conduit located near the intersection of Fenn Street and East Street. This conduit conveys intermittent discharge from Silver Lake and stormwater runoff from Fenn Street and East Street to the Housatonic River.

The primary contaminants found in the lake are PCBs. Data collected over the course of several years show the highest concentrations of PCBs along the east edge of the lake directly adjacent to the 40s Complex, with contamination as high as 20,689 ppm. The surface water in the lake was found to contain PCBs in levels ranging from 0.14 to 0.34 parts per billion (ppb). In the sediments, non-PCB hazardous substances contain the following maximum concentrations: benzo(a)anthracene (8.1 ppm), benzo(a)pyrene (7.6 ppm), benzo(b)fluoranthene (6.8 ppm), benzo(k)fluoranthene (7.7 ppm), chrysene (8.5 ppm), dibenzo(a,h)anthracene (2.0 ppm), indeno(1,2,3-cd) pyrene (4.3 ppm), napthalene (18.0 ppm), phenanthrene (9.8 ppm), pyrene (16.0 ppm), dioxin (0.055 ppb-2,3,7,8-TCDD only), lead (3,910 ppm) and zinc (1,890 ppm). In the surface water, non-PCB hazardous substances were found at the following maximum concentrations: lead (8.4 ppb), zinc (31.2 ppb), and diethylphthalate (68 ppb) (AR Doc. # 9).

The banks of Silver Lake contain PCBs as high as 250 ppm in surface soils (0 - 6 inch depth) along the northeast bank of Silver Lake along Silver Lake Boulevard. Concentrations ranging from 20 to as high as 210 ppm were detected in near surface (6 - 18 inch depth) soil along the eastern and western banks of the lake. The western bank of Silver Lake abuts residential properties. Surface soils along this bank showed PCB levels as high as 52 ppm (AR Doc. # 9).

**b. Groundwater/NAPL Groundwater Management Removal Action Areas (GMAs)**

As stated above, in addition to removal actions to address soil, sediment and surface water contamination, this Action Memorandum also proposes removal actions to address contamination in the groundwater and NAPL phase. Response actions for groundwater/NAPL are proposed for the following five areas:

GMA #1

**Plant Site 1** - which consists of the 20s Complex, the 30s Complex, the 40s Complex, East Street Area 2 - South, East Street Area 2- North, East Street Area 1 - North, East Street Area 1 - South, the Lyman Street Area, Newell Street Area I, Newell Street Area II, and the Silver Lake Area. For GMA #1, the boundaries of East Street Area I include the area bounded by East Street, Fasce Street, the Housatonic River, and Newell Street.

Groundwater in this GMA has been found to contain PCBs in levels as high as 51,600 ppb (unfiltered) and 420 ppb (filtered) in the Lyman Street area and 3,700 ppb in unfiltered samples and 770 ppb in filtered samples in wells along the east edge of Silver Lake. Non-PCB hazardous substances have been detected in groundwater in this GMA at the following maximum concentrations: carbon tetrachloride (860 ppb), chlorobenzene (2,500 ppb), benzene (1,100 ppb), toluene (1,700 ppb), xylene (1,200 ppb), vinyl chloride (3,260 ppb), trichloroethene (5,600 ppb), tetrachloroethene (100 ppb-estimated), 1,3-dichlorobenzene (70 ppb), 1-4-dichlorobenzene (491 ppb), 1,2,4-trichlorobenzene (1,200 ppb), 1,1,1-trichloroethane (11,000 ppb), total 1,2-

dichloroethene (550 ppb), diethylphthalate (1 ppb), benzo(a)anthracene (120 ppb), benzo(a)pyrene (100 ppb-estimated), benzo(b)fluoranthene (~~110 ppb-estimated~~), benzo(k)fluoranthene (110 ppb-estimated), chrysene (160 ppb), dibenzo(a,h)anthracene (3 ppb), indeno(1,2,3-cd) pyrene (62 ppb), napthalene (145,000 ppb), phenanthrene (93 ppb), pyrene (9 ppb), lead (914 ppb), copper (200 ppb), cadmium (6 ppb), and chromium (40 ppb) (AR Doc. #s 3, 9, 11, 12 and 19).

NAPL is present in the following areas of this GMA:

**East Street Area 1 - North.** Lighter-than-water NAPL ("LNAPL") that contains up to 146 ppm PCBs (AR Doc. # 4).

**East Street Area 2 - North/the 20s Complex/East Street Area 2 -South.** LNAPL that contains up to 53,000 ppm PCBs and up to 49,270 ppm napthalene (AR Doc. # 3).

**East Street Area 2 - South.** Denser-than-water NAPL ("DNAPL") is present in two locations: in one location, the DNAPL contains up to 110,000 ppm napthalene, 39,000 ppm phenanthrene, 34,000 ppm pyrene, and other polynuclear aromatic hydrocarbons ("PAHs") (AR Doc. # 28); the other location, west of Building 68, the DNAPL contains up to 624,000 ppm PCBs and up to 190,000 ppm 1,2,4-trichlorobenzene (AR Doc. # 21).

**East Street Area 2 - North**

DNAPL is present in this area that contains up to: 570,000 ppm PCBs, 370,000 ppm 1,2,4-trichlorobenzene, 37,000 ppm 1,4-dichlorobenzene, 8,800 ppm 1,4-dichlorobenzene, and 8,600 ppm 1,3-dichlorobenzene (AR Doc. # 8).

**Lyman Street Area.** LNAPL that contains up to: 27,000 ppm PCBs, 1,280 ppm 1,2,4-trichlorobenzene, 1,200 ppm 1,4-dichlorobenzene, 630 ppm chlorobenzene, 6,600 ppm pyrene and other PAHs, and DNAPL that contains 98,000 to 660,000 ppm PCBs, up to 134,000 ppm PAHs, up to 78,000 ppm carbon tetrachloride, up to 30,000 ppm 1,2,4-trichlorobenzene, up to 20,000 ppm trichloroethene, and up to 10,000 ppm xylenes (AR Doc. # 29).

**Newell Street Area II.** DNAPL that contains up to: 388,500 ppm PCBs, 430,000 ppm 1,2,4-trichlorobenzene, 87,000 ppm trichloroethene, 23,000 ppm 1,4-dichlorobenzene, 9,200 ppm xylenes, 7,900 ppm 1,2-dichlorobenzene, 4,800 ppm cis-1,2-dichloroethene, 3,300 ppm toluene, and 2,800 ppm tetrachloroethene (AR Doc. # 29).

LNAPL that contains up to: 24,000 ppm PCBs, 7,300 ppm 1,4-dichlorobenzene, and 1,500 ppm 1,3-dichlorobenzene (AR Doc. # 29).

GE has installed and continues to operate NAPL/groundwater recovery and control systems at East Street Area 1, East Street Area 2, the Lyman Street Area, and Newell Street Area II, as described in Attachment H to the Statement of Work for Removal Actions Outside the River (which is attached to the Consent Decree ) (see also Section II.B, Other Actions to Date).

GMA # 2

**Former Oxbows J and K** - Same as described above in Section 3.a.

Unfiltered groundwater samples were collected from well points in this GMA and were found to contain PCBs as high as 3.61 ppb. Non-PCB hazardous substances have been detected at the following maximum concentrations: total 1,2-dichloroethene (18 ppb), vinyl chloride (10 ppb-estimated), lead (40 ppb), copper (35 ppb), and chromium (21.1 ppb) (AR Doc. # 10).

NAPL has not been observed in this GMA.

GMA # 3

**Plant Site 2** - which consists of the Unkamet Brook Area described in Section 3.a. above, excluding the portion west of Plastics Avenue.

PCBs have been detected in groundwater in concentrations as high as 7.9 ppb. Non-PCB hazardous substances have been detected in groundwater in this GMA at the following maximum concentrations: chlorobenzene (280,000 ppb), benzene (140 ppb), toluene (3,600 ppb), xylene (1,000 ppb), vinyl chloride (2,100 ppb), trichloroethene (76,800 ppb), tetrachloroethene (21 ppb), 1-4-dichlorobenzene (220 ppb), 1,2,4-trichlorobenzene (50 ppb-estimated), 1,1,1-trichloroethane (11 ppb), total 1,2-dichloroethene (2,900 ppb), napthalene (1,300 ppb), lead (360 ppb), copper (560 ppb), and chromium (460 ppb) (AR Doc. # 5).

LNAPL is present in this area. The LNAPL contains 48 ppm PCBs, 360 ppm napthalene and 320 ppm phenanthrene (AR Doc. # 14). GE currently conducts monitoring and LNAPL recovery activities in this area.

GMA # 4

**Plant Site 3** - which consists of the Hill 78 Consolidation Area, the Building 71 Consolidation Area, Hill 78 Area - Remainder, and the portion of the Unkamet Brook Area to the west of Plastics Avenue.

PCBs have been detected in unfiltered groundwater in concentrations as high as 960 ppb. Non-PCB hazardous substances have been detected in groundwater in this GMA at the following

maximum concentrations: chlorobenzene (36,000 ppb-estimated), benzene (1,000 ppb-estimated), toluene (2,000 ppb-estimated), xylene (2,000 ppb-estimated), ~~vinyl chloride (2~~3,000 ppb), trichloroethene (320,000 ppb), tetrachloroethene (5 ppb), 1-4-dichlorobenzene (2,000 ppb-estimated), 1,2,4-trichlorobenzene (2,000 ppb-estimated), 1,1,1-trichloroethane (13,000 ppb), total 1,2-dichloroethene (180 ppb), diethylphthalate (1 ppb), lead (15.8 ppb), copper (10,000 ppb), cadmium(5,000 ppb-estimated) and chromium (23,000 ppb) (AR Doc. # 6).

In May 1999, LNAPL was detected in one well in this GMA. The LNAPL was analyzed and 3,100 ppm PCBs were detected (AR Doc. # 31).

GMA # 5

**Former Oxbows A and C** - same as described in Section 3.a. above.

Unfiltered groundwater samples were collected from well points in this GMA and were found to contain PCBs as high as 27.8 ppb. Non-PCB hazardous substances have been detected in groundwater in this GMA at the following maximum concentrations: chlorobenzene (11 ppb), benzene (4 ppb-estimated), xylene (3 ppb-estimated), vinyl chloride (10 ppb-estimated), total 1,2-dichloroethene (5 ppb-estimated), benzo(a)anthracene (5 ppb-estimated), benzo(a)pyrene (4 ppb-estimated), chrysene (6 ppb-estimated), indeno(1,2,3-cd) pyrene (1 ppb-estimated), napthalene (34 ppb), phenanthrene (12 ppb), pyrene (12 ppb), lead (112 ppb), copper (112 ppb), , and chromium (32.2 ppb) (AR Doc # 10).

NAPL has not been observed in this GMA.

### *4. Release or Threatened Release into the Environment of a Hazardous Substance, or, Pollutant or Contaminant*

The primary contaminants of concern are PCBs. PCBs are hazardous substances as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14). PCBs are present in soils, sediments, surface water, NAPL, and groundwater at various portions of the Site. Therefore, a release into the environment of hazardous substances has already occurred. Other hazardous substances as defined by Section 101(14) of CERCLA that have been released at the Site include, but are not limited to, dioxins, carbon tetrachloride, chlorobenzene, benzene, toluene, xylene, vinyl chloride, trichloroethene, tetrachloroethene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1-4, dichlorobenzene, 1,2,4-trichlorobenzene, 1,1,1-trichloroethane, cis-1,2-dichloroethene, diethylphthalate, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd) pyrene, napthalene, phenanthrene, pyrene, lead, copper, cadmium, chromium, and zinc.

Moreover, there continues to be a threat of additional releases of PCB and other hazardous substances from the contaminated soils and NAPLs into the surface water and groundwater at the Site.

*5. NPL Status*

As stated above, EPA proposed the Site for inclusion onto the NPL on September 25, 1997. As part of the proposed Consent Decree with GE, EPA has agreed to defer a final decision on the proposed listing subject to certain conditions, including GE's successful implementation of these removal actions.

**B. Other Actions to Date**

GE has performed several Short-Term Measures (also referred to as Immediate Response Actions) in recent years pursuant to the RCRA Corrective Action Permit and the ACOs including, but not limited to:

- Excavation and off-site disposal of PCB-contaminated soils at portions of approximately twelve residential properties located in the floodplain between Lyman Street and the confluence of the East and West Branches of the Housatonic River.

- Installation and operation of groundwater and NAPL recovery systems at the GE Plant Area, the Newell Street II Area and the Lyman Street Area.

- Excavation and off-site disposal of PCB-contaminated soils and sediments and the removal of drums and capacitors from Unkamet Brook.

- Excavation and off-site disposal of contaminated surface soils and the installation of a temporary soil cover at Oxbow C.

- Excavation and off-site disposal of contaminated surface soils at portions of the Newell Street I properties.

- The installation of a temporary two-foot soil cover over approximately 5 acres and the subsequent excavation and off-site disposal of approximately 1,600 cubic yards of contaminated soil located outside temporary soil cover at Allendale School.

In addition, EPA has previously determined that CERCLA removal actions were warranted at the following portions of the Site:

The Building 68 Area of the East Street 2 - South/Upper ½-Mile Reach

On December 18, 1996, pursuant to Section 106 of CERCLA, EPA issued GE a Unilateral Administrative Order requiring the excavation of heavily contaminated riverbank soils and sediments from a 550-foot stretch of the Housatonic River adjacent to Building 68. From June 1997 through December of 1998, GE excavated and disposed of 12,640 tons of PCB-contaminated soils and sediments, and installed 180 feet of impermeable sheetpiling to limit the migration of DNAPL from entering the Housatonic River (AR Doc. # 16).

The "Upper Reach" of the Housatonic River (approximately two miles)

On May 26, 1998, EPA Region I's Director of the Office of Site Remediation and Restoration issued a Combined Action and EE/CA Approval Memorandum documenting the need for a removal action in the area of the Site covering approximately two miles of the Housatonic River, riverbanks and floodplains from the Newell Street Bridge to the confluence of the East and West Branches of the Housatonic River (AR Doc. # 24).

The Combined Action and EE/CA Approval Memorandum specified certain source control actions and riverbank and sediment excavation activities in the approximately ½-mile from Newell to Lyman Street.

GE agreed to perform the required source control activities. From May 1998 through the present GE has: conducted numerous subsurface investigations; installed approximately 485 linear feet of impermeable sheetpile along the riverbank at the East Street Area 2 - South area of the Site to supplement the groundwater/NAPL recovery well system and prevent LNAPL from discharging into the Housatonic River; installed an automated recovery system to remove DNAPL from the Newell Street II area of the Site; and has submitted a detailed design for the installation of impermeable sheetpile at the Lyman Street Area of the Site to supplement the groundwater/NAPL recovery well system and prevent LNAPL and DNAPL from discharging into the Housatonic River.

As part of the Consent Decree, GE has also agreed to perform the required riverbank and sediment excavation activities in the approximate ½-mile from Newell Street to Lyman Street upon lodging of the Consent Decree with the Court. GE submitted a Draft Work Plan in January 1999 and a Final Work Plan in June 1999 for the ½-Mile Reach Removal Action.

The Combined Action and EE/CA Approval Memorandum also authorized EPA to conduct an EE/CA to determine the appropriate removal action activities for the next approximately 1½

miles (i.e., from Lyman Street to the confluence of the East and West Branches of the Housatonic River). Pursuant to the Consent Decree, the parties have agreed that EPA and GE would jointly finance, and EPA would perform, the required removal action activities in these 1½ miles to address the contaminated sediments and riverbanks and that GE would conduct the required removal action activities in the floodplains. As such, the EE/CA would be limited to the removal activities to be performed by EPA and an EE/CA will not be necessary for the floodplains. The required removal activities for the floodplains (excluding riverbanks) in the 1½ miles are documented in this Action Memorandum as part of the removal actions for the Housatonic River Floodplain.

The Allendale School Property

On July 12, 1999, EPA Region I's Regional Administrator issued an Action Memorandum documenting the need for a removal action at the Allendale School Property area of the Site. GE is currently implementing the required actions specified by Allendale School Property Action Memorandum.

### C. State and Local Authorities' Roles

As mentioned above, the Massachusetts and Connecticut DEPs, the Massachusetts and Connecticut Natural Resource Trustees and the City of Pittsfield have been extensively involved with negotiations regarding the proposed removal actions specified in this Action Memorandum. These agencies and the City of Pittsfield have been consulted and concur with and support EPA's proposed actions, as signified by their signing of the Consent Decree.

## III. Threats to Public Health or Welfare or the Environment

As described below, the conditions at the Site meet the general criteria for a removal action, as set forth in 40 C.F.R. § 300.415(b)(1), in that "there is a threat to public health or welfare of the United States or the environment." In addition, conditions present at the Site meet the specific criteria for a removal action set forth in 40 CFR § 300.415(b)(2) as described below.

- **"Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants" [300.415(b)(2)(i)].**

**Potential exposure to nearby humans from contaminated soil.**

At all of the areas listed in Section II.A.3.a. — Soil, Sediment, and Surface Water Removal Action Areas, there is the potential for direct contact with hazardous substances in soils.

In parts or all of the Unkamet Brook Area, Oxbows A and C, Oxbows J and K, the Housatonic River Floodplain, and the Silver Lake Area (bank soils), ~~access is unrestricted~~ and the land use is residential, recreational, or commercial. Therefore, the potential exists for residents, recreational users, workers, and trespassers to come in contact with contaminated soil. Direct contact with contaminated surficial soil could result in the ingestion, inhalation and/or dermal adsorption of hazardous substances. In addition, any disturbance of subsurface soils, which is currently not prohibited, could expose people to contaminated subsurface soils.

Other areas of the Site, such as Newell Street I, East Street Area I and portions of the Lyman Street Area, are non-GE owned commercial/industrial properties. Access in many of these areas is not restricted. Therefore, the potential exists for workers, customers, and trespassers to come in contact with contaminated surface soils. Also, any disturbance of subsurface soils (e.g., for building expansion, installation of fence posts, regrading of parking areas, repaving, etc.) could result in the uncovering and exposure of contaminated soils.

The remaining areas of the Site subject to removal actions are owned by GE and are primarily used for commercial/industrial purposes or are vacant lots with access restricted by fencing. Current exposure to contaminated soils could occur to on-site workers, contractors and delivery personnel. Furthermore, due to these areas being located in the center of a densely populated city, and due to the size of the areas, there is the potential for trespassers to access them and come in contact with contaminated soils. Furthermore, the Consent Decree contemplates the potential transfer of portions of GE-owned property to the Pittsfield Economic Development Authority and the potential creation of a recreational facility on GE property. Therefore, if the proposed removal actions were not conducted, the potential for exposure to contaminated surface soils would significantly increase. The potential for subsurface exposure of contaminated soils is similar to that described above for non-GE owned property.

The human health effects of some of the hazardous substances present in contaminated soil at the Site are presented below.

PCBs

The concentrations of PCBs present at the Site exceed or have the potential to exceed default standards and cleanup levels considered protective of public health including: the Massachusetts Contingency Plan Method 1 default standard of two ppm for both residential and industrial soils; EPA's PCB Spill Cleanup Policy, 40 CFR Part 761, (10 ppm in residential areas— if capped, 25 ppm in industrial areas); and the preliminary remediation goals (1 ppm for residential areas, 10 to 25 ppm for industrial use) specified in EPA OSWER Directive 9355.4-01.

Numerous studies on the health effects of PCBs have been performed. Studies of workers exposed to PCBs suggest that PCBs can cause skin irritations, such as acne and rashes, and cause

irritation of the nose and lungs. Other reported human health effects include general weakness, respiratory symptoms, altered immune response, and damage to the liver (*Toxicological Profile for Polychlorinated Biphenyls, Draft for Public Comment (Update)*, by the U.S. Department of Health and Human Services/Agency for Toxic Substances and Disease Registry, September 1997 ("*ATSDR Toxicological Profile*")). There are also studies which have reported neurological, behavioral, and developmental abnormalities in children born to mothers who ate PCB-contaminated fish. However, in these studies, the mothers' exposures to PCBs were estimated and not measured directly (*ATSDR Toxicological Profile* and AR Doc. # 23).

PCBs, at sufficiently high levels, have been shown to produce a wide variety of adverse effects in many test animals, including severe acne, liver, stomach and thyroid damage, and reproductive and developmental effects. Monkeys, which are physiologically more similar to humans than other animals, have developed adverse immunological and neurological effects, as well as skin and eye irritations after being fed PCBs. PCBs may cause similar health effects in people (*ATSDR Toxicological Profile* and AR Doc #23).

PCBs have also been found to cause cancer in animals. Based on the animal studies, the United States Department of Health and Human Services has determined that PCBs may reasonably be anticipated to be human carcinogens. Similarly, EPA classifies PCBs as a probable human carcinogen, and the International Agency for Research on Cancer has determined that PCBs are probably carcinogenic to humans (*ATSDR Toxicological Profile*).

Therefore, exposure to the high levels of PCBs present at the Site could increase both the cancer risk and non-cancer risk to area residents, workers, recreational users and trespassers.

Non-PCB Hazardous Substances

Further characterization of non-PCB hazardous substances present at the Site will be performed as part of the proposed removal actions. Based on the limited sampling completed to date, there is potential for elevated levels of non-PCB hazardous substances to be present in soils at the Site. Some of the more toxic compounds detected in soils at areas of the Site subject to the proposed removal actions and their potential effects to human health are:

Lead

Exposure can occur through dust inhalation and soil ingestion. Ingestion of lead by small children may cause a decrease in intelligence quotient (IQ) scores and reduced growth. Lead exposure in adults may decrease reaction time and possibly affect memory. At high levels of exposure, lead can severely damage the brain and kidney in adults or children. Lead exposure may have effects on reproduction and women who are pregnant, if exposed to lead, may have premature births, smaller babies, or miscarriages. (*Toxicological Profile for Lead, Draft for*

*Public Comment (Update)*, by the U.S. Department of Health and Human Services/Agency for Toxic Substances and Disease Registry, September 1997).

Dioxin

Dioxin has a tendency to persist in the environment. It can bind to soil particles and bioaccumulate in the food chain, especially in fish. Dioxin in contaminated soils can enter the human body through ingestion, inhalation, and dermal adsorption.

Human exposure to very high levels of dioxin causes chloracne and is suspected of causing liver impairment. EPA considers dioxin to be a possible human carcinogen. Dioxin also has been shown to cause biochemical alterations; thyroid, reproductive and immune toxicity; and cancer in animals. Dioxin may cause similar effects in people. (*ATSDR Toxicological Profile for Chlorinated Dibenzo-p-Dioxins, Draft for Public Comment (Update),* by the U.S. Department of Health and Human Services/Agency for Toxic Substances and Disease Registry, September 1997).

In 1998, EPA issued a directive recommending Preliminary Remediation Goals (PRGs) for setting cleanup levels for dioxin in soils at CERCLA and RCRA corrective action sites (*Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites*, OSWER Directive 9200.4-26, April 13, 1998). Those PRGs, measured as Toxic Equivalents (TEQs) of the most potent dioxin congener (2,3,7,8-TCDD), are 1 part per billion (ppb) for surface soil in residential areas and a range of 5 to 20 ppb for soil in commercial/industrial areas.

Other Probable Human Carcinogens present in soils at the Site

The following hazardous substances present in soils at the Site are classified by EPA as probable human carcinogens: Tetrachloroethene, trichloroethene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd) pyrene.

**Potential exposure to nearby humans from vapors in buildings.**

The contaminated groundwater/NAPL present at the Site represents a potential threat of exposure of hazardous substances to humans by the infiltration of vapors emanating from groundwater/NAPL, if such vapors should enter into occupied buildings. Potential vapors may contain vinyl chloride, benzene, trichloroethene, tetrachloroethene, and carbon tetrachloride, all of which have been detected in groundwater and/or NAPL at the Site. Vinyl chloride and benzene are classified by EPA as known human carcinogens, and trichloroethene, tetrachloroethene, and carbon tetrachloride are classified by EPA as probable human carcinogens.

- **"Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants" [300.415(b)(2)(i)], and "Actual or potential contamination of drinking water supplies or sensitive ecosystems" [300.415(b)(2)(ii)].**

As discussed in Section II.A.3.a. — Soil, Sediment, and Surface Water Removal Action Areas, the sediments in Unkamet Brook contain PCB concentrations as high as 430 ppm and soil samples in the Unkamet Brook floodplain contain PCBs in concentrations as high as 19 ppm. Furthermore, Unkamet Brook bisects the Unkamet Brook landfill, and, as recently as June 1998, GE removed exposed drums, capacitors, bushings and insulators along the banks of the brook.

As discussed in Section II.A.3.a. — Soil, Sediment, and Surface Water Removal Action Areas, the sediments in Silver Lake contain PCBs in concentrations as high as 20,689 ppm. Even excluding this hot spot, the average concentration of PCBs in the top foot of sediments is 330 ppm. PCBs have been detected in the surface water in concentrations as high as 0.34 ppb, which is an order of magnitude greater than the ambient water quality criteria of 0.014 ppb for PCBs (freshwater, chronic for ecological receptors).

It has been extensively documented in the peer-reviewed literature that PCBs in the ecosystem may cause a variety of adverse effects to ecological receptors including: death, birth defects, reproductive failure and impairment, liver damage, tumors, behavioral modifications (such as abandonment of nest building activities), and a "wasting" syndrome (AR Doc. # 22).

The presence of high levels of PCBs in these sensitive ecosystems (i.e., water bodies) coupled with the literature-documented adverse effects of PCBs on ecological receptors, indicates there is a current or potential threat to the environment in these two areas.

Furthermore, as discussed in Section II.A.3.b. — Groundwater/NAPL Management Areas (GMAs), the groundwater at each GMA is contaminated with at least one hazardous substance. The hazardous substances include: PCBs, chlorobenzene, benzene, 1,1,1-trichloroethane, 1,2-dichloroethene, trichloroethene, tetrachloroethene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and 1,2,4-trichlorobenzene. In addition to the groundwater, NAPL is present at the Site which contains high concentrations of PCBs, carcinogenic PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd) pyrene), carbon tetrachloride, and chlorobenzenes.

The groundwater at the Site discharges to either Unkamet Brook, Silver Lake or the Housatonic River. Currently, control of the groundwater discharge to these surface waters consists mainly of groundwater extraction and treatment in support of preventing the migration of NAPLs. At a majority of the groundwater/surface water interface, there is no hydraulic control to prevent discharge to the surface water. Therefore, there is a potential threat of release of these hazardous

substances to surface waters (i.e., sensitive ecosystems). Part of the proposed actions contained in this Action Memorandum are procedures to further characterize the groundwater contamination, the magnitude of the threat to the surface waters, and, if necessary, to conduct additional response actions.

- **"High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate" [300.415(b)(2)(iv)] and, "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released"[300.415(b)(2)(v)].**

At the removal action areas that are adjacent to or include the banks of Silver Lake, Unkamet Brook or the Housatonic River, storm events may cause hazardous substances in surface soils to flow, via surface water run-off, into these surface waters. The areas where this threat exists are East Street Area 2 - South, the Unkamet Brook Area, Former Oxbows A and C, the Lyman Street Area, Newell Street Area I, Newell Street Area II, Former Oxbows J and K, the Housatonic River Floodplain Area, and the Silver Lake Area. Storm events may also cause the sediments in Unkamet Brook and bank soils at Oxbows J and K to erode and migrate downstream.

**Summary of NCP Criteria for a Removal Action**

The information presented above demonstrates that, pursuant to 40 C.F.R. 300.415(b)(1), the Site presents a threat to public health or welfare of the United States or the environment. The following table summarizes which criteria specified in 40 C.F.R. § 300.415(b)(2) are met for each area in this Action Memorandum for which there is a removal action proposed.

| NCP Criteria/Site Area | §§(b)(2)(i) | §§(b)(2)(ii) | §§(b)(2)(iv) | §§(b)(2)(v) |
|---|---|---|---|---|
| The 20s Complex | √ | | | |
| The 30s Complex | √ | | | |
| The 40s Complex | √ | | | |
| East Street Area 2- South | √ | | √ | √ |
| East Street Area 2 - North | √ | | | |
| East Street Area 1 | √ | | | |
| Hill 78 Consolidation Area | √ | | | |
| Building 71 Consolidation Area | √ | | | |
| Hill 78 - Remainder | √ | | | |

| | | | | |
|---|---|---|---|---|
| Unkamet Brook Area | √ | √ | √ | √ |
| Former Oxbows A and C | √ | | √ | √ |
| Lyman Street Area | √ | | √ | √ |
| Newell Street Area I | √ | | √ | √ |
| Newell Street Area II | √ | | √ | √ |
| Former Oxbows J and K | √ | | √ | √ |
| Floodplain - Residential Properties in 1 ½-mile* | √ | | √ | √ |
| Floodplain - Non-residential Properties in 1 ½-mile* | √ | | √ | √ |
| Floodplain - Residential Properties Downstream of the Confluence | √ | | √ | √ |
| The Silver Lake Area | √ | √ | √ | √ |
| GMAs 1 through 5 | √ | √ | | |

*A removal action was determined to be warranted for these two areas in EPA's May 26, 1998 Combined Action and EE/CA Approval Memorandum.

Notes: [300.415(b)(2)(i)] "Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants."

[300.415(b)(2)(ii)] "Actual or potential contamination of drinking water supplies or sensitive ecosystems."

[300.415(b)(2)(iv)] "High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate."

[300.415(b)(2)(v)] "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released."

# V. Proposed Actions and Estimated Costs

## A. Proposed Actions

### *1. Proposed Action Description*

**Contaminated soils, sediments and surface water response actions**

***General Items***

For the areas subject to the removal actions subject to this Action Memorandum, further sampling will be performed for PCBs. The extent of response actions to address PCBs in soil will be determined by spatial averaging methods, as described in the SOW.

The justification for the protectiveness of the PCB cleanup levels proposed below is provided in Attachment A (August 4, 1999 Memorandum from Ann-Marie Burke, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Human Health*) and Attachment B (July 26, 1999 Memorandum from Susan Svirsky, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Ecological Receptors*).

Further sampling will also be performed for non-PCB hazardous substances. Additional response actions will be required if contamination of the non-PCB hazardous substances exceeds (after factoring in the required response action for PCBs), EPA Preliminary Remediation Goals, background levels, Massachusetts Contingency Plan Method 1 or 2 soil standards and/or risk-based standards. Attachment F of the Statement of Work for Removal Actions Outside the River contains the specific details for this procedure.

For all removal actions performed in accordance with this Action Memorandum, contaminated soils, sediments, asphalt, and building debris will be placed in the Hill 78 Consolidation Area, the Building 71 Consolidation Area and potentially, in an on-site consolidation area on the corner of New York Avenue and Merrill Road. The consolidation areas will then be covered with a multilayer cap and a groundwater monitoring program will be implemented. If the volume of contaminated sediments and soils exceeds the capacity of the on-site consolidation units, then this material may be transported off-site for disposal or otherwise managed in an appropriate manner, potentially including on-site treatment and disposal.

In addition, GE intends to demolish certain buildings at the GE Plant Area under a Definitive Economic Development Agreement with the City of Pittsfield. For disposition of the debris from these building demolition activities, GE may use the on-site consolidation areas described above. GE may also use the foundations of certain buildings at the GE Plant Area for placement of such

debris. Although the building demolition activities themselves are not part of the removal actions described in this Action Memorandum, the placement of building demolition debris in building foundations will be part of these removal actions, and GE will be required to meet procedures and protocols approved by EPA for the placement of such debris in the building foundations, the covering of such foundations after such use, and groundwater monitoring downgradient of these foundations.

The description of the response actions set forth below is a general overview of those response actions. A more specific description of the response actions to be taken in these areas, along with a detailed specification of the Performance Standards for those response actions, is set forth in Section IX of the Consent Decree and in the SOW. The response actions that GE will be required to undertake and the Performance Standards that must be achieved for those response actions will be governed by the requirements and Performance Standards in the Consent Decree and SOW, rather than by the general descriptions in this Action Memorandum.

***Response Actions at the GE Plant Area (the 20s Complex, the 30s Complex, the 40s Complex, East Street Area 2 – South, East Street Area 2 – North, East Street Area 1, Hill 78 – Remainder, Unkamet Brook Area) excluding the Hill 78 Consolidation Area, the Building 71 Consolidation Area and potentially, an on-site consolidation area on the corner of New York Avenue and Merrill Road.***

The objectives are to conduct response actions in surface soils to allow unrestricted commercial/industrial/recreational use and to minimize exposure to contaminants in deeper soils.

Response actions shall include:

a. At areas other than the recreational property in the Unkamet Brook Floodplain:

- Conduct response actions to achieve average PCB concentrations of 25 ppm or less in surficial soils (0-1 foot) -- via soil removal in unpaved floodplain areas (to avoid loss of flood storage capacity), capping in other unpaved areas, and pavement maintenance/enhancement in paved areas (except in the 200-foot wide strip described below).
- Install an engineered barrier to minimize infiltration and prevent exposure in areas where the average PCB concentration exceeds 100 ppm within the top 15 feet.
- Conduct response actions in areas where the average PCB concentration exceeds 200 ppm in soils 1-6 feet deep, consisting of soil removal/replacement to achieve that average PCB concentration or, in paved areas outside the floodplain, enhancement of the existing pavement. However, where utilities are present in paved areas outside the floodplain, an evaluation of additional response actions shall be submitted to EPA for review and approval.

- Remove the pavement, gravel, buildings/structures (except the 64W oil/water separator), and underlying soil to a depth of one foot in a 200-foot wide riparian strip on the north (GE Plant) side of the River between the former Thermal Oxidizer location and the facility boundary, and replace it with a vegetative engineered barrier (unless recreational cleanup standards are met).
- In an area of the GE Plant proposed for use by the City as a recreational ballfield, install a one-foot cover of clean soil and ensure achievement of a PCB average of 15 ppm in the next two feet.
- Ensure that if new subgrade utilities are installed or existing utilities are repaired or replaced, the backfill used will have an average PCB concentration of 25 ppm or less.

b. Unkamet Brook and Floodplain Response Actions:

- Reroute the brook to its approximate former channel, which is on the east side of the former Unkamet Brook landfill, and cap entire former landfill with an engineered barrier in paved areas and a landfill cap in unpaved areas.
- Remove brook sediments and cover or remove inundated wetland sediments to achieve an average PCB concentration of 1 ppm or less in surface sediments.
- Remove soils in the GE-owned wetland area east of the former landfill and in the Unkamet Brook recreational floodplain to achieve an average PCB concentration of 10 ppm or less in the top foot and an average PCB concentration of 15 ppm or less in the 1-3 foot depth.
- Remediate commercial/industrial properties in the Unkamet Brook Area to standards consistent with those applicable to GE-owned commercial/industrial portions of the GE Plant Area.

c. Environmental Restrictions Easements (EREs)

GE will impose on its own property and make best efforts to secure from non-GE property owners, EREs, which are deeded land use restrictions, to (1) prohibit non-industrial uses (except for allowances of recreational uses in current recreational portions of the Unkamet Brook floodplain and other portions of the Plant Area to be used for recreational purposes); (2) control contact with subsurface soils; (3) prohibit interference with response actions; and (4) restrict the use of groundwater.

***Response Actions at the Hill 78 Consolidation Area, the Building 71 Consolidation Area and, potentially, an on-site consolidation area on the corner of New York Avenue and Merrill Road.***

Contaminated sediments, soils, asphalt, concrete, and building debris generated during the performance of other removal actions (as well as debris from building demolition activities under

GE's Definitive Economic Development Agreement with the City) will be placed either into either the Hill 78 Consolidation Area, the Building 71 Consolidation Area or potentially, an on-site consolidation area on the corner of New York Avenue and Merrill Road. Materials excluded from all on-site consolidation areas include: free liquid, free product, intact drums or capacitors, and other equipment that contains PCBs within its internal components, all of which will be appropriately disposed of off-site. Soils and sediments that meet the criteria for hazardous waste or have average PCB concentrations greater than 50 ppm will be placed in the either the Building 71 Consolidation Area or potentially, an on-site consolidation area on the corner of New York Avenue and Merrill Road. For all on-site consolidation areas except for the Hill 78 Consolidation Area, an impermeable liner and leachate collection system will be installed prior to the placement of any material. After the placement of contaminated soils, sediments, asphalt, concrete, and building debris generated during other removal actions, a protective multilayered cap will be installed and a groundwater monitoring system will be implemented. GE shall impose EREs on these areas to (1) prohibit non-industrial uses; (2) control contact with subsurface soils; (3) prohibit interference with response actions; and (4) restrict the use of groundwater.

If the volume of contaminated material exceeds the capacity of the on-site consolidation units, then this material may be transported off-site for disposal or otherwise managed in an appropriate manner, potentially including on-site treatment and disposal.

***Response Actions at the Former Oxbows Areas (Former Oxbow Areas A and C, the Lyman Street Area, Newell Street Area I, Newell Street Area II, and Oxbows J and K).***

The objective is to achieve appropriate cleanup standards keyed to different current uses and expected future uses (i.e., commercial, recreational, or residential) and to allow for changes in property use.

Response actions shall include:

- For GE owned parking lots, remove surficial soils (top one foot), replace them with a vegetative engineered barrier (with certain potential exceptions specified in the SOW, subject to EPA approval), and impose EREs on the property.
- For current commercial/industrial and recreational areas not owned by GE, GE shall make best efforts to obtain access and appropriate EREs and to perform response actions consistent with the following:

  either: obtain EREs with owners' consent and perform response actions as follows:

  (i) commercial/industrial properties - achieve average PCB concentrations consistent with GE Plant Area standards; and

(ii) recreational properties - achieve average PCB concentrations of 10 ppm or less in top foot and 15 ppm or less in the 1-3 foot interval;

or: if GE cannot obtain EREs, response actions, called Conditional Solutions in Section XIII of the Consent Decree, will be performed, which include, but are not limited to, the following:
(i) achieve average PCB concentrations of 25 ppm or less in the top 1 and 3 feet and 200 ppm or less in the 1 to 6 foot interval for commercial properties and 10 ppm or less in the top 1 and 3 feet for recreational properties; and
(ii) GE will conduct, and further certify to the owners upon the owners' request of its commitment to conduct, further response actions needed to be protective of any legally permitted future use for which the owner has submitted a plan to the appropriate government authority and the plan has been approved by the authority, if such approval is necessary, and for which the owner has provided other documented evidence of a commitment to such use.

- For residential properties, achieve an average PCB concentration of 2 ppm or less.

***Response Actions at the Housatonic River Floodplain Area.***

Floodplain Current Residential Properties Adjacent to the 1 ½-Mile Reach – Actual/Potential Lawns

Remove soils in Actual/Potential Lawn areas (as defined in the Consent Decree) to achieve an average PCB concentration of 2 ppm or less.

Floodplain Non-Residential Properties Adjacent to the 1 ½-Mile Reach – (Excluding Banks)

Remove soils in non-riverbank areas to achieve an average PCB concentration of 10 ppm or less in the top foot and 15 ppm or less at the 1-3 foot depth. GE shall make best efforts to secure EREs for these properties. If GE cannot obtain an ERE, GE shall implement a Conditional Solution as described above.

Floodplain Residential Properties Downstream of the Confluence – Actual/Potential Lawns

a. Remove soils in Actual/Potential Lawn areas to achieve an average concentration of 2 ppm or less.

b. Implement short term measures (e.g., signs) for riverbanks exceeding the Massachusetts DEP trigger levels for short-term measures.

***Response Actions at the Silver Lake Area.***

- Remove bank soils to achieve an average PCB concentration of 10 ppm or less in top foot and 15 ppm or less at 1-3 feet, except at residential properties, which shall achieve an average PCB concentration of 2 ppm or less. GE shall make best efforts to secure ERE's on non-residential properties. If GE cannot obtain an ERE, GE shall implement a Conditional Solution as described above.

- Excavate approximately 400 cubic yards of heavily contaminated sediments near the outfall.

- Cap the entire 26-acre lake bottom and install armoring over the cap bottom in shoreline areas subject to erosion.

- Perform periodic reviews of the effectiveness of the cap and armor to determine if design standards are being maintained. If design standards are not met, additional actions will be evaluated and, if necessary, implemented.

**Groundwater/NAPL Response Actions**

Groundwater/NAPL response actions will be performed at all 5 GMAs identified above. These response actions will be in addition to the source control response actions currently being performed by GE.

The overall objective is to ensure that contaminated groundwater and NAPLs do not adversely impact surface waters, sediments, and biota, including those in the Housatonic River, Silver Lake, and Unkamet Brook, and also to ensure that contaminants in the groundwater do not pose an unacceptable risk to human health via inhalation of vapors potentially migrating from the groundwater and/or NAPL into occupied buildings. These two objectives are consistent with the classification of the Site groundwater under the Massachusetts Contingency Plan (310 CMR 40.0932).

To achieve this objective, the proposed actions will include:

- Conducting a baseline assessment and monitoring program to establish existing conditions;
- Establishing appropriate risk-based groundwater standards to meet the objectives identified above;
- Installing and monitoring a perimeter and sentinel (early warning) groundwater detection systems;
- Continuing, and if necessary, expanding NAPL and groundwater treatment systems to prevent NAPL from discharging to surface waters and to attain appropriate groundwater standards; and,

- Requiring GE to impose on its own property EREs that restrict the use of groundwater and prohibit interference with groundwater-related response actions. GE will also attempt to obtain from non-GE property owners (excluding residential property owners), where groundwater-related response actions are taken, agreements not to interfere with such response actions. These agreements will be in addition to any local ordinances requiring restrictions on well installation and groundwater use.

**Post-Removal Site Control**

GE has agreed to perform post-removal site control (PRSC) as defined in Section 300.415(l) of the NCP. PRSC activities will include ensuring continued compliance with the performance standards and implementing inspection, monitoring, and maintenance plans.

### *2. Contribution to Remedial Performance*

No additional remedial activities are expected to be performed in the areas of the Site that are the subject of this Action Memorandum. EPA and GE are studying the need for, and the extent of, remedial actions in the Rest of the River (as defined by the Consent Decree). The proposed removal actions will not interfere with any possible remedial action for the Rest of the River and are likely to enhance the effectiveness of any possible remedial action.

### *3. Description of Alternative Technologies*

EPA personnel will evaluate any alternative technologies proposed by GE and determine if they are appropriate for this Site.

### *4. Engineering Evaluation/Cost Analysis ("EE/CA") or Equivalent*

Section 300.415(b)(4) of the NCP states that whenever a planning period of six months exists before on-site activities must be initiated, and the lead agency determines a removal action is appropriate, the lead agency shall conduct an EE/CA or its equivalent.

In its evaluation of appropriate removal actions pursuant to 300.415, EPA determined that a formal EE/CA, as outlined in the EPA Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (August 1993), was unnecessary since its equivalent had already been performed, in large part, under other authorities, and those parts not already performed are addressed in this Action Memorandum or in the proposed Consent Decree, the Statement of Work for Removal Actions Outside the River or its attachments. EPA's guidance lists the 5 principal parts of an EE/CA as follows:

- Site Characterization

- Identification of Removal Action Scope, Goals, and Objectives
- Identification and Analysis of Removal Action Alternatives
- Comparative Analysis of Removal Action Alternatives
- Recommended Removal Action Alternative

Site Characterization

An extensive amount of Site Characterization work and risk assessment/evaluation was previously done under the RCRA Corrective Action Permit, State Administrative Consent Orders, the Unilateral Administrative Order issued by EPA to address the Building 68 Area, and EPA's Combined Action and EE/CA Approval Memorandum for the 2-Mile Reach, which addressed the ½-mile and any potential sources to the River. The Site Description and Background; Previous Removal Actions; Source, Nature, and Extent of Contamination; Analytical Data; and Streamlined Risk Evaluation have all been completed and documented in the administrative records for the above-listed actions. A summary of the Site Characteristics is provided in Section II.A.3. above.

Identification of Removal Action Scope, Goals, and Objectives

EPA completed the Identification of Removal Action Scope, Goals, and Objectives during negotiations with GE and these are reflected in the Consent Decree and SOW. The intent of the removal actions is to respond to the threats to human health and the environment so that final NPL Listing will not be necessary. The scope of the removal actions is set out in Section IV of the Consent Decree in the definition of "Removal Actions Outside the River". Included are Removal Actions at the GE Plant Area; Removal Actions at the Former Oxbow Areas; the Allendale School Removal Action; the Silver Lake Area Removal Action; the Removal Actions within the Housatonic River Floodplain; and NAPL/Groundwater Removal Actions. The Removal Actions Outside the River, along with the Upper ½-Mile Reach Removal Action and the 1 ½-Mile Reach Removal Action, will prevent or minimize the migration of PCBs and other hazardous substances to the Rest of River Area, thereby ensuring that the goals of these removal actions are consistent with the long-term remediation to be performed as part of the Rest of River Remedial Action.

The Performance Standards set out in Section IX of the Consent Decree, the Statement of Work, and the attachments identify the Goals and Objectives of the removal actions, which have been determined by EPA to be appropriate. Attached to this Action Memorandum and included as part of the Administrative Record are human health and ecological risk evaluations of the proposed cleanup levels.

The schedule for conducting the removal actions is outlined in Section VII of the Consent Decree, with the initial submittal dates specified in Attachment A (for non-groundwater-related removal actions) and Attachment H (for groundwater-related removal actions) of the SOW.

Identification and Analysis of Removal Action Alternatives

EPA performed the Identification and Analysis of Removal Action Alternatives during negotiations with GE. The Agency's analysis of alternatives was necessarily limited due to site-specific factors, principally the extremely large size of the contaminated area and the volume of contaminated soils and sediments. The initial evaluation focused on the question of treatment versus containment, i.e., to what extent, if any, should the PCB contaminated soils and/or sediments be treated to reduce toxicity, mobility, or volume or, alternatively, should containment be used to provide protectiveness.

In making this evaluation, the Agency considered the Superfund program management expectations outlined in the NCP § 300.430 (a) (1) (iii) (A), (B), and (C) for remedial actions since the removal actions under consideration are intended to be final actions. In general, the Agency expects to use treatment to address the principal threats posed by a site, whenever practicable; to use engineering controls for waste that poses a relatively low, long term threat or where treatment is impracticable; and to supplement engineering controls with institutional controls to prevent or limit exposure to remaining residual waste.

The Agency defines principal threat wastes to include liquids, high concentrations of toxic compounds, and highly mobile materials. The principal threat wastes at this Site were the millions of gallons of transformer oils and other liquid wastes containing very high levels (20 - 50 %) of PCBs and which have, for the most part, already been addressed by treatment either on-site in GE's Thermal Oxidizer, which operated from the early 1970s up until the late 1980s, or at off-site commercial incinerators. To the extent that such "principal threat" wastes are recovered or generated at the Site during the conduct of these removal actions, e.g., drums of liquid waste, NAPL recovered from groundwater, etc., these wastes will be sent off-site for treatment and subsequent disposal in accordance with these expectations. Otherwise, the wastes remaining at the Site consist of relatively low levels of PCB contaminated soils and/or sediments which are spread over a large area measuring hundreds of acres. PCBs are relatively immobile due to their low solubility in water. Thus, the Agency's expectation to use treatment to address principal threats, such as liquid wastes, high concentrations of toxic compounds, or highly mobile materials, is not applicable at this Site. Therefore, on-site treatment alternatives were not considered for analysis.

As stated above, if the volume of contaminated sediments and soils exceeds the capacity of the on-site consolidation units, then this material may be proposed for another form of appropriate

management, potentially including on-site treatment and disposal. Should this occur, EPA will further evaluate on-site treatment alternatives.

PCB contamination is present both at the surface and, in many cases, at depths up to 15 feet, including burial in two relatively large landfills at Hill 78 and Unkamet Brook. Hundreds of thousands of cubic yards of soil are contaminated above levels considered to be protective by the Agency. This immense volume of contaminated soils makes it impracticable to fully excavate all of the soils and further to treat the excavated soils. The situation at Silver Lake is similar. Sediments are contaminated with PCBs to depths of five feet and greater over the entire 26 acre lake bottom. The volume of contaminated soil exceeds 175,000 cubic yards (AR Doc. # 9), making it technically infeasible to excavate or dredge the contaminated sediments. Consequently, capping of the Lake bottom is the only feasible alternative, with the exception of a small (i.e., 400 cubic yard) hot spot near the outfall pipe. The hot spot material will be excavated and placed in an on-site consolidation unit. The specific cap design will be determined, after pre-design studies, in accordance with the Performance Standards and design standards set forth in Attachment K to the SOW. Therefore, the alternatives analysis focused on the use of engineering containment in combination with institutional controls to provide protectiveness, in accordance with the aforementioned program expectations.

In evaluating the types of containment remedies which could be used at the Site, either alone or in combination with institutional controls, the Agency considered its experiences at other Superfund sites and at equivalent sites managed under the Massachusetts Contingency Plan, State and Federal ARARs, and the Agency use of presumptive remedies for similar situations or types of wastes. The general approach used at containment remedy sites is to consolidate wastes into a defined area or areas and/or contain in place. This is then followed by the installation of a protective cap, engineered to minimize the infiltration of precipitation into the consolidated wastes and to prevent direct contact with the wastes. Institutional controls, e.g., deed restrictions or EREs, are then used to ensure that the protective cap is not compromised by future activities at the Site, such as excavation.

The alternatives analysis then focused on the range of capping alternatives which could be used at the Site. EPA considered soil cover, paving, hazardous waste landfill caps ( a.k.a. RCRA C caps) and various combinations thereof. The approach selected entails excavating surficial contaminated soils in industrial/commercial areas and backfilling with clean fill or enhancing the existing pavement to prevent exposure to contaminated surficial soils. It also includes excavation and replacement of surface and near-surface soil in recreational areas as necessary to meet recreational cleanup standards. Where higher contaminant levels remain at depth, an engineered barrier meeting the requirements of the Massachusetts Contingency Plan will be installed and maintained to prevent direct contact and to minimize infiltration of precipitation. The specific technical requirements for these barriers are similar to those previously used at the

Sprague Electric Site, in North Adams, Massachusetts. Sprague Electric is a similar industrial site with PCB contamination.

Finally, institutional controls comparable to the Massachusetts Environmental Use Restrictions will be effectuated to prevent excavation or other activities that could disturb the barrier or otherwise allow for exposure to contaminated soils remaining at depth.

The two landfills, one of which will also receive additional contaminated material, along with any other on-site consolidation areas, will be capped in accordance with appropriate landfill caps as specified in the SOW.

Comparative Analysis of Removal Action Alternatives

The Agency did not conduct a specific Comparative Analysis of the effectiveness, implementability, and cost of the various types of caps/covers proposed since the type of cap for any particular area is governed by ARARs, the effectiveness and implementability of each type are well known to EPA based on previous experiences, and the incremental cost differences between the various types of caps were not a critical factor since the removal actions will not be Fund-financed.

Recommended Removal Action Alternative

The recommended removal action alternates for each area of the Site subject to this Action Memorandum are summarized in Section V.A.1.

### *5. Applicable or Relevant and Appropriate Requirements (ARARs)*

Attachment B of the SOW and Tables 1 and 2 of the Work Plan for On-Site Consolidation Areas, which are appended to the Consent Decree, identify the ARARs and EPA's determination of the applicability and practicability of complying with each ARAR. EPA's determination was based on the criteria set forth in 40 CFR § 300.415(j).

For any off-site disposal of hazardous substances, GE shall comply with EPA's off-site rule (40 C.F.R. 300.440 – Procedures for Planning and Implementing Off-Site Response Actions).

In addition to the ARARs described above, EPA Region I's Regional Administrator, by approving this Action Memorandum, makes the following determinations.

1. Consolidation of hazardous waste, if present, on the GE facility will be conducted within a defined Area of Contamination (AOC). The defined AOC for this Site includes the entire Site, as defined by the Consent Decree. According to both 55 FR 8758-8760, March 1990, and a recent

EPA guidance, *"Use of Area of Contamination Concept during RCRA Clean-ups,"* March 13, 1996, the entire Site may be defined as an AOC because it includes discrete areas of generally dispersed contamination (i.e., contiguous contamination at varying levels across the site). EPA has determined that the movement of waste within an AOC is not considered "placement" for the purpose of RCRA. The concept of "placement" is important because the "placement" of hazardous waste into the landfill or other land-based unit is considered land disposal for RCRA purposes, which triggers the land disposal restrictions and other RCRA requirements. Since the movement of waste material around the AOC is not considered placement, the consolidation units fall under the category of "existing non-regulated landfills" (i.e., no "placement" of waste material has occurred after November 19, 1980 (see 40 CFR 270.1(c)). Therefore, the design and operating requirements of 40 CFR Parts 264 and 265 do not apply to this type of consolidation.

2. The removal actions proposed in this Action Memorandum, including on-site consolidation, will be conducted in accordance with 40 CFR 761.61(c), which addresses risk-based response actions for the remediation of PCB waste (i.e., contaminated soil, sediments and groundwater). 40 CFR 761.61(c) details the requirements for the risk-based approval. Specifically, this section requires that the following elements be submitted to EPA's Regional Administrator for approval:

- A summary of the nature of the contamination;
- A summary of the sample procedures used to characterize the Site;
- A summary of the location and extent of the identified contamination;
- A cleanup plan for the Site; and,
- A written certification that all sampling plans and procedures used to assess and characterize the Site are available for review.

The previous sampling and analytical plans and site investigation reports submitted by both GE and EPA, many of which are included in the Administrative Record for this Action Memorandum, meet the requirements of the first three bullets. This Action Memorandum, the Consent Decree and attached Statement of Work for Removal Actions Outside the River meet the requirements of the next two bullets.

40 CFR 761.61(c)(2) states that if the above-referenced summary, plans and certifications, etc., are submitted, "EPA [the Regional Administrator] will issue a written decision . . . for a risk-based method for PCB remediation wastes. EPA will approve such an application if it finds that the method will not pose an unreasonable risk of injury to health or the environment."

By signing this Action Memorandum, the Regional Administrator is making a determination that the proposed response actions will not pose an unreasonable risk of injury to health or the environment. This determination is based on the following:

- A risk-based evaluation for the protectiveness of the proposed PCB cleanup levels was performed and is provided in Attachment A (August 4, 1999 Memorandum from Ann-Marie Burke, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Human Health*) and Attachment B (July 26, 1999 Memorandum from Susan Svirsky, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Ecological Receptors*) of this Action Memorandum. These attachments conclude that the PCB cleanup levels will not pose an unreasonable risk of injury to health or the environment.

- GE will be required to achieve a PCB cleanup level of 25 ppm in backfill in new or repaired/replaced utility corridors. This cleanup level is the same as the cleanup level for surface soil at commercial/industrial properties. Since utility workers performing routine utility work in the new or repaired/replaced utility corridors are likely to have lower exposure than the groundskeepers evaluated in the commercial/industrial scenario, this cleanup level will be protective for such workers. In the meantime, to ensure protection of utility workers in existing utility corridors, EPA will rely on the 200 ppm cleanup level for short-term (e.g., emergency) utility excavation work, together with the health and safety protocols that are required for such workers under the EREs and/or by State or federal law and/or the performance standards for Conditional Solutions.

- All of the on-site consolidation areas and the Unkamet Brook landfill will be capped, and therefore there will be no exposure to PCB-contaminated soils. The caps will also be impermeable and will therefore prevent or minimize of infiltration of water and will minimize the migration of PCB-contaminated material from beneath the landfills/consolidation areas to the surrounding area. As an added precaution, the Building 71 consolidation area and, potentially, an on-site consolidation area on the corner of New York Avenue and Merrill Road, which are the areas that will receive soils and sediments that meet the criteria for hazardous waste or contain average PCB concentrations greater than 50 ppm, will have a bottom liner and leachate collection system to further restrict migration of contaminants. Furthermore, a groundwater monitoring system will be installed at the perimeter of the landfill and all on-site consolidation areas.

- The capping of the Silver Lake sediments and the installation of armor in areas subject to erosion will prevent human and ecological exposure to contaminated sediments.

- The groundwater performance standards will all be risk-based and consistent with the classification of the Site groundwater under the Massachusetts Contingency Plan (310 CMR 40.0932).

- GE will perform post-removal site control activities including ensuring continued compliance with the Performance Standards and implementing inspection, monitoring, and maintenance plans.

- GE will impose on its own property, and make efforts to secure from non-GE property owners (except at residential properties), EREs, which are deeded land use restrictions, to (1) prohibit non-industrial uses in industrial areas; (2) prohibit residential use in industrial/recreational areas; (3) control contact with subsurface soils; (4) restrict the use of groundwater, and (5) prohibit interference with response actions. If an ERE cannot be obtained at a non-GE non-residential property, GE will implement a Conditional Solution, as described in the Consent Decree and summarized in Section V.A.1 of this Action Memorandum. EPA has determined that such Conditional Solutions are also protective of human health and the environment provided that the conditions for such solutions are met.

### *6. Project Schedule*

GE will prepare the on-site consolidation units, perform the removal action for the Upper ½-Mile Reach, and continue to perform the removal action for Allendale School upon lodging of the Consent Decree. GE will utilize the on-site consolidation units for the materials excavated during both of these removal actions. (Although the excavation of soils and sediments in the Upper ½-Mile Reach and the excavation of soils at Allendale School are not addressed by this Action Memorandum, the placement of the material in the on-site consolidation areas is addressed by this Action Memorandum.)

After the Consent Decree is lodged, a public comment period will be held. EPA will provide a response to comments for the Court to review. Implementation of other removal actions proposed in this Action Memorandum will be performed after the Consent Decree is entered by the Court and will likely take five to ten years to complete. An initial schedule of deliverables for each removal action is included in Attachments A and H to the SOW.

## B. Estimated Costs

Since GE has agreed to perform these actions pursuant to a Consent Decree, this Action Memorandum does not include a request for funds for EPA to conduct the proposed removal actions. In accordance with 40 C.F.R. § 300.415(k), the 12-month and $2,000,000 statutory limits to removal actions do not apply to responsible party lead removal actions. Funding to monitor GE's performance will be required.

## VI. Expected Change in the Situation Should Action be Delayed or Not Taken

Delayed or no action will increase the human health and environmental risks by allowing for: (1) the continuation of direct contact, ingestion, inhalation and adsorption of PCBs and non-PCB hazardous substances by residents, recreational users, trespassers, and workers; (2) the continued migration of PCBs and non-PCB hazardous substances; and (3) the continued threats and damage to sensitive ecosystems (i.e., Silver Lake, Unkamet Brook and its associated floodplain, and the Housatonic River).

## VII. Enforcement — Intended for Internal Distribution Only

See attached.

## VIII. Recommendation

This decision document represents the selection of certain removal actions at the GE–Housatonic River Site, in Pittsfield, Massachusetts. The proposed removal actions were developed in accordance with CERCLA, as amended, and are not inconsistent with the NCP. This decision document is based on documents contained in the administrative record for the Site. (See Appendix A for the Administrative Record File Index and the List of Selected Key Guidance Documents.)

As stated in Section III, conditions at the Site meet the NCP §300.415(b)(2) criteria for removal actions in that there are:

- "Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants" [300.415(b)(2)(i)];
- "Actual or potential contamination of drinking water supplies or sensitive ecosystems" [300.415(b)(2)(ii)];
- "High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate" [300.415(b)(2)(iv)], and
- "Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released" [300.415(b)(2)(v)].

The removal actions proposed in this Action Memorandum will abate, prevent, minimize, stabilize, mitigate and/or eliminate the release or threat of release of hazardous substances at the Site. Therefore, I recommend your approval of this Action Memorandum.

Approval: _____ Date: 3/5/99
John P. DeVillars
Regional Administrator

Disapproval: _____ Date: _____
John P. DeVillars
Regional Administrator

Attachments:

Enforcement Strategy (Confidential)

Attachment A: August 4, 1999 Memorandum from Ann-Marie Burke, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Human Health*

Attachment B: July 26, 1999 Memorandum from Susan Svirsky, EPA to Richard Cavagnero, EPA titled *Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Ecological Receptors*

Appendix A: Administrative Record File Index

Appendix B: Index of Selected Key Guidance Documents

**United States Environmental Protection Agency**
**Region I**
**One Congress Street, Suite 1100**
**Boston, MA 02114-2023**

**Memorandum**

**DATE:** August 4, 1999

**SUBJECT:** Protectiveness of Cleanup Levels for Removal Actions Outside the River - Protection of Human Health

**FROM:** Ann-Marie Burke, Toxicologist
Technical Support Section, EPA Region 1 AB

**TO:** Richard Cavagnero, GE Project Leader
USEPA, Region 1

The purpose of this memorandum is to present an evaluation of the protectiveness of the cleanup levels (i.e., performance standards), for PCBs in soil in the Action Memorandum for Removal Actions Outside the River at the GE-Housatonic River Site, Pittsfield, Massachusetts and in the Action Memorandum for Allendale School, GE-Pittsfield/Housatonic River Site, Pittsfield, Massachusetts.

Subpart E of the National Contingency Plan (NCP)(Superfund), supplemented by Agency Guidance, establishes the criteria for determining when exposure levels are protective of human health. As noted in EPA's OSWER Directive 9355.0-30 "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions," EPA uses a cancer risk range of $10^{-4}$ to $10^{-6}$ as a "target range" within which the Agency strives to manage risks. Although the Agency has expressed a clear preference for cleanups achieving the more protective end of the range (i.e. $10^{-6}$), waste management strategies achieving reductions in site risks anywhere within the risk range may be deemed acceptable. As is noted in Subpart E, the *total* cancer risk attributed to the response goals (e.g., cleanup levels) should fall within a $10^{-4}$ to $10^{-6}$ lifetime excess cancer risk range. Thus if other contaminants of concern are detected in these areas, the cleanup levels of these contaminants and those presented below for PCBs must collectively meet EPA's target risk range.

In choosing cleanup levels for compounds having noncarcinogenic effects, it is EPA's policy to select a concentration of a compound at which adverse effects are unlikely to occur. The hazard quotient is the measure of the potential for noncancer effects. The hazard quotient is the ratio of the exposure dose of a single substance to a reference dose (RfD) for that substance. The RfD

attempts to establish a level of exposure below which there is a high degree of confidence that no effects will occur. Since the actual observed effects occur at significantly higher doses than an RfD value, we assume that the threshold of effects is somewhere between the estimated RfD and the Lowest Observable Effect Level (LOEL). Because of the conservatism built into the RfD an exposure that is only slightly above an RfD value does not signify that adverse effects are likely to occur. Rather for exposures close to an RfD it is reasonable to assume that it is generally unlikely that adverse effects would occur. Likewise a HQ slightly above one does not indicate adverse effects will occur. Based on the above, the cleanup levels for PCBs are protective of the most sensitive receptor for each exposure area as defined below.

The following table shows the calculated excess cancer risk and hazard quotient associated with the cleanup level for each exposure area of the site.

| Areas | Cleanup Level (ppm) | Depth (ft) | Excess Cancer Risk | Hazard Quotient |
|---|---|---|---|---|
| Recreational | 10 | 0-1 | $7x10^{-6}$ | 1.4 |
| Recreational | 15 | 1-3 | NC | NC |
| Industrial (surface) | 25 | 0-1 | $6x10^{-6}$ | 0.4 |
| Indust.(subsurface) | 200 | 1-6 | $1x10^{-5}$ | 0.9 |
| Residential | 2 | 0-15 | $4x10^{-6}$ | 0.8 |
| Allendale School | 2 | 0-15 | $4x10^{-6}$ | 0.8 |

NC - not calculated; see qualitative discussion below

**1. Recreational Areas 0-1ft (10 ppm)**

This cleanup level applies to any area of the Site in which the current or future use is recreational. This includes areas in which there may by a playground, a ballfield, a bike path, a picnic area, a scenic walkway, etc. A daycare scenario is not considered in deriving this cleanup level since this use does not typically occur in recreational settings. Since the actual activity which will occur in each area of the Site designated as "recreational" is unclear, this cleanup level is protective of the recreational use which is likely to result in the greatest exposure to the most sensitive receptor. Thus the cleanup level of 10 ppm for PCBs in soil is protective of a young child visiting a playground. For other recreational areas in which less exposure occurs to less sensitive individuals, this cleanup level is lower and more protective than the Agencies would typically set. However, due to the uncertainty about future exposures, one cleanup level has been chosen for all recreational areas. Choosing one cleanup level which is protective of the most sensitive receptor for all recreational scenarios provides a simplified yet reasonable and protective approach for soil cleanup.

In estimating noncancer hazards and excess cancer risks associated with this, cleanup level it is assumed that a child (ages 1-13) visits the playground 3 days per week for 7 months of the year

(May through November) when the ground is not frozen or covered with snow. It is also assumed that a child's head, lower arms, hands, lower legs and feet could be exposed to contaminated soil during the warmer months (from May through September) and that in the colder months (from October through November) a child's head and hands could be exposed.

**Estimated noncancer hazard associated with oral and dermal exposure to recreational soils**

$$HQ = C_s \times F \times D \left[\frac{1}{(BW_C \times AT_{nc})} \times \frac{IR_c \times FI \times ABS_o}{RfD_o \quad 10^6 mg/kg} + \frac{1}{} \times \frac{[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7] \times ABS_d}{RfD_o \quad 10^6 mg/kg}\right]$$

HQ = hazard quotient
$C_s$ = PCB concentration in soil, (i.e., cleanup level) (10mg/kg)
F = exposure frequency; (84dys/yr)=3dys/wkx4wks/mos 7mos/yr, (May-Nov); site-specific
D = duration;(6 yrs); Site-specific
$IR_c$= soil ingestion rate for child 1-6; 200mg/dy; EPA, 1991
FI = fraction ingested from site; (0.5); site-specific
$ABS_o$= GI absorption fraction; (1); PTI, 1993
$SA_1$ = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 $cm^2$ ;EPA, 1997; Based on;

- Mean fraction total SA for child obtained from Table 6-8, (EPA, 1997)
- Total SA determined by averaging 50th percentile SA by body part for males/females of appropriate age groups, from Table 6-6 and 6-7 (EPA, 1997)
- Due to lack of data for the indicated ages, assumed <1 and 1<2 year olds had the same total SA as 2>3 year olds
- Assumed forearm-to-arm ratio (0.45) and lower leg-to-leg ratio (0.4) equivalent to an adult.

$AF_1$ = overall skin adherence factor weighted by body-part exposed;
For child 1-6 = 0.24mg/$cm^2$ -event:

- data from Kissel et. al, 1998., (children playing in dry soil)
- No AF was available for feet or head so overall AF based on AFs for face, forearms, hands and lower legs. However, SA in equation for HQ based on SA of all exposed body parts. Thus feet AF assumed by default to have same amount of soil adhered as weighted AF.
- Used 95th percentile for AF for each body part exposed which resulted in a 95th percentile overall skin adherence factor (mg/$cm^2$).

$$AF_1(\text{child}_{1\text{-}6}) = \frac{(AF_{face})(SA_{face})+(AF_{forearms})(SA_{forearms})+(AF_{hands})(SA_{hands})+(AF_{lowerlegs})(SA_{lowerlegs})}{(SA_{face})+(SA_{forearms})+(SA_{hands})+(SA_{lowerlegs})}$$

$$= \frac{(326)(0.022)+(393)(0.135)+(358)(0.413)+(650)(0.329)}{326+393+358+650} = 0.24$$

$SA_2$= surface area for a child exposed during Oct thru Nov. = head and hands;
= 1340 $cm^2$ for 1-6 yr old
$AF_2$= overall skin adherence factor weighted by body part exposed from Oct thru Nov

$AF_2$ (child $_{1\text{-}6}$) $= \frac{(326)(0.022)+(358)(0.413)}{326(face)+358} = 0.23$

$ABS_d$ = dermal absorption fraction; (0.14), Wester et. al, 1993

BW = average body weight; 15 for 1-6yr old (EPA, 1997)

$AT_{nc}$ = averaging time, 6yrsx365dys/yr - (2190 dys); Site-specific

RfD = reference dose for Aroclor 1254 = $2x10^{-5}$ mg/kg-dy; IRIS, 1998

Substituting the values above into the equation:

$$THQ = \frac{10 \times 84 \times 6}{[15 \times 2190]} \left[ \frac{(1 \times 200 \times 0.5)}{2x10^{-5} \quad 10^6} + \frac{(1 \times [((2900 \times 0.24 \times 5)+(1340 \times 0.23 \times 2))/7] \times 0.14}{2x10^{-5} \quad 10^6} \right]$$

$$= \frac{5040}{(32850)} \left( \frac{100}{20} + \frac{[((3480)+(616.4))/7] \times 0.14}{20} \right) = 45845.8/32850 = 1.4$$

**Estimated excess cancer risk associated with oral and dermal exposure to recreational soils**

$$ELCR = \frac{C_s \times F \left[ (CSF \times ABS_o \times IF_{adj}) + (SFS_{adj} \times CSF \times ABS_d) \right]}{AT_c \times 10^6 \text{ mg/kg}}$$

Where;.

ELCR = excess lifetime cancer risk

$C_s$ = PCB concentration in soil, (i.e., cleanup level)(10mg/kg)

F = exposure frequency; (84dys/yr)=3dys/wkx4wks/mos 7mos/yr, (May-Nov); site-specific

CSF = cancer slope factor for PCBs $(2 \text{ mg/kg-dy})^{-1}$ ; IRIS, 1998

$ABS_o$ GI absorption fraction; (1); PTI, 1993

$IF_{adj}$ = age- adjusted soil ingestion factor, equal to:

$$\frac{(FI)(IR_{1\text{-}6})(D_{1\text{-}6})}{BW_{1\text{-}6}} + \frac{(FI)(IR_{7\text{-}13})(D_{7\text{-}13})}{BW_{7\text{-}13}} = 40 + 8.2 = 48.2 \text{mg-yr/kg-dy}$$

Where;

$IR_c$ = soil ingestion rate; child 1-6; 200mg/dy; child 7-13; 100mg/dy; EPA, 1991

FI = fraction ingested from site; (0.5); site-specific

BW = average body weight; 15 for 1-6yr old; 36.8, based on average of mean body weights for boys/girls ages 7-13, from Table 7-3; EPA, 1997,

D = duration;(6 yrs); Site-specific

$SFS_{adj}$ = age-adjusted soil contact factor=

$$\frac{(D_{1\text{-}6})[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7]_{1\text{-}6}}{BW_{1\text{-}6}} + \frac{(D_{7\text{-}13})[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7]_{7\text{-}13}}{BW_{7\text{-}13}}$$

$$= \frac{(6)[((0.24x2900x5)+(0.23x1340x2))/7]}{15} + \frac{(6)[((0.26x4276x5)+(0.26x1733x2))/7]}{36.8} = 384.5$$

Where;

$SA_1$ = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 $cm^2$ (see above), for child 7-13=4276 $cm^2$;EPA, 1997; Based on same assumptions as for $SA_1$ above (see noncancer calculations).

$AF_1$ = overall skin adherence factor weighted by body-part exposed;

For child 1-6 = 0.24mg/cm$^2$ -event( see above); For child 7-13:

- used same data and approach as for child 1-6 above. Surface area based on 7-13 yr old

$AF_1$ (child $_{7\text{-}13}$) = $\frac{(429)(0.022)+(633)(0.413)+(667)(0.135)+(1096)(0.329)}{429+633+667+1096} = 0.26$

$AF_2$ (child$_{1\text{-}6}$) = 0.23 mg/cm$^2$ -event( see above)

$AF_2$ (child$_{7\text{-}13}$) = (429)(0.22) + (633) (0.413) / (429) + 633 = 0.26

$SA_2$= surface area for a child exposed during Oct thru Nov. = head and hands;
1340 cm$^2$ for 1-6 yr old; 1733 cm $^2$ for 7-13 yr old

$ABS_d$ = dermal absorption fraction; (0.14), Wester et. al, 1993

$AT_c$ = averaging time, 70yrsx365dys/yr - (25550days); Site-specific

Substituting the values above into the equation:

$$ELCR = \frac{10x84\ [(2x1x48.2) + (384.5\ x0.14\ x2)]}{(25550)(10^6 mg/kg)}$$

$$= \frac{840(96.4 + 107.7)}{25550x10^6} = \frac{171410.4}{25550x\ 10^6} = 6.7 \times 10^{-6}$$

Thus a 10 ppm cleanup level in recreational soils is associated with an excess cancer risk of $7x10^{-6}$ and a noncancer hazard of 1.4.

**2. Recreational 1-3ft (15ppm)**

A child at a playground is expected to be exposed to soils in the top foot. This is based on the typical activities which tend to occur in playgrounds and the expectation that an Environmental Restriction and Easement (ERE) will limit exposures at depth. However, since elevated concentrations of PCBs do exist below one foot in certain areas of the Site, an added measure of protection was selected to further reduce any possibility of exposure to the contaminated soils in the 1-3 foot interval. As a result, soils at the 1-3 foot depth will be cleaned up to a level of 15 ppm as an added measure of protection.

**3. Commercial/Industrial 0-1ft (25 ppm)**

For future commercial/industrial areas of the Site, the cleanup level has been set at 25 ppm. A daycare scenario is not considered in deriving this cleanup level since this use does not typically occur in industrial settings. Those individuals who are the most likely to receive the highest exposure to surface soils in these areas are groundskeepers who will be involved in activities such as gardening, mowing the lawn, sculpturing bushes, etc. In estimating noncancer hazards and excess cancer risks associated with this cleanup level, it is assumed that an groundskeeper works outdoors for 3 days per week for 7 months of the year (May through November) when the ground is not frozen or covered with snow. It is also assumed that a groundskeeper's head, forearms and hands are exposed to contaminated soil throughout this time.

Office workers could also be exposed to contaminated surface soil. However, their exposure is likely to be much lower than that of a groundskeeper. Thus the cleanup level for a groundskeeper should be protective for an office worker.

**Estimated noncancer hazard associated with oral and dermal exposure to a groundskeeper in industrial areas**

$$HQ = \frac{C_s \times FxD}{(Bwa \times AT_{nc})}\left[\left(\frac{1}{RfD_o} \times \frac{IR_a \times FI \times ABS_o}{10^6\ mg/kg}\right) + \left(\frac{1}{RfD_o} \times \frac{AF \times SA \times ABS_d}{10^6 mg/kg}\right)\right]$$

Where;

HQ = hazard quotient
$C_s$ = PCB concentration in soil, (i.e., cleanup level) (25mg/kg)
F = exposure frequency; (84dys/yr)=3dys/wkx4wks/mos 7mos/yr, (May-Nov); site-specific
D = duration;(25 yrs); EPA, 1991
IRa = soil ingestion rate for adult worker; 50mg/dy; EPA, 1991
FI = fraction ingested from site; (1); professional judgement
$ABS_o$ GI absorption fraction; (1); PTI, 1993
SA = surface area of a groundskeeper exposed during May thru November = head, forearms and hands ($3300cm^2$)

- average of 50th percentile SA for body part of males/females >18yrs
- Assume female adult forearm SA is 45% of the arm SA (based on info in males)

AF = overall skin adherence factor weighted by body part exposed($0.1mg/cm^2$ -event)
Based on gardener data from EPA, 1997, using the 50th% for the AF for each body part which results in an overall 50th % AF. The AF dataset for a gardener was chosen because it represents a "high-end" activity for a groundskeeper. When using a high-end activity, the 50th percentile for the AF best approximates the RME scenario, thus the choice of the 50th % for the adherence factor.
$ABS_d$ = dermal absorption fraction; (0.14), Wester et. al, 1993
BW = average body weight; 70kg (EPA, 1997)
$AT_{nc}$ = averaging time, 25yrsx365dys/yr - (9125 dys); Site-specific
RfD = reference dose for Aroclor 1254 = $2x10^{-5}$ mg/kg-dy; IRIS, 1998

Substituting the values above into the equation:

$$HQ = \frac{25 \times 84 \times 25}{(70 \times 9125)}\left[\left(\frac{(1)}{2x10\text{-}5} \times \frac{(50x1)}{10^6}\right) + \left(\frac{1}{2x\ 10\text{-}5} \times \frac{(3300x\ 0.1 \times 0.14)}{10^6}\right)\right]$$

$$= \frac{52500}{638750}\left(\frac{50}{20} + \frac{46.2}{20}\right) = 0.4$$

**Estimated excess cancer risk associated with oral and dermal exposure to groundskeeper in commercial areas**

$$ELCR = \frac{C_s \times FxDxCSF\ [(ABS_o \times IRxFI) + (SA \times AF \times ABS_d)}{BWx\ AT_c \times 10^6\ mg/kg}$$

See above for additional definition and values of terms;
$At_c$ = averaging time, 70yrsx365dys/yr - (25550 dys); EPA, 1991
CSF = cancer slope factor for PCBs (2 mg/kg-dy)$^{-1}$; IRIS, 1998
Substituting into this equation;

$$ELCR = \frac{25x\ 84x25x2\ [(1)(50) + (0.1x0.14x3300)}{(70)(25550)(10^6 mg/kg)}$$

$$= \frac{105000\ (50+46.2)}{1788500x\ 10^6}$$

$$= \frac{10101000}{1788500x\ 10^6} = \quad 5.6x10^{-6} \text{ or } 6x10^{-6}$$

Thus a 25 ppm cleanup level in soils is associated with an excess cancer risk of $6x10^{-6}$ and a noncancer hazard of 0.4.

**4. Commercial/Industrial Subsurface (1-6 foot depth) - 200 ppm**

The cleanup level for the 1-6 foot depth interval on commercial/industrial properties is 200 ppm. Based on the EREs and other Consent Decree provisions, it is expected that the only individual likely to be exposed to PCBs at 200 ppm in the 1-6 foot depth interval would be a utility worker conducting infrequent, short-term work in existing utility corridors (e.g., emergency utility repairs).

This cleanup level is deemed protective for such situations. In estimating cancer and noncancer risks associated with this cleanup level, it is assumed that the worker is exposed during these situations to contaminated subsurface soil for 5 days per year for 25 years. This exposure is evaluated cumulatively over 25 years, not as separate acute exposures. Dermal contact with and incidental ingestion of soil was considered. It was assumed that the worker's head, hands and forearms could come into contact with contaminated soil.

The cleanup level of 200 ppm equates to a Hazard Index of 0.9 and an excess cancer risk of $1 \times 10^{-5}$.

The values used to calculate the risk levels associated with 200 ppm are provided below. Sources for each value are also provided. The equations used are the same as those used to estimate risks for Industrial areas and are shown in Section 3.

Values used to estimate risks associated with the cleanup level of 200 ppm

| | | |
|---|---|---|
| HQ | = | Hazard Quotient |
| ELCR | = | Excess Lifetime Cancer Risk |
| IR | = | Soil Ingestion Rate, 137 mg/kg (ChemRisk, 1997) |
| F | = | Exposure Frequency, 5 days/yr (Geraghty and Miller, 1992) |
| D | = | Exposure Duration, 25 yrs; Site specific |
| $C_s$ | = | Concentration in soil ( cleanup level), 200 mg/kg |
| BW | = | Body weight, 70 kg (EPA 1991) |
| $At_{nc}$ | = | Averaging Time for noncancer, 9125 days (25 years x 365 days/yr) |
| $At_c$ | = | Averaging Time for cancer, 25550 days (70 yrs x 365 days/yr) |
| SA | = | Skin surface area, 3300 $cm^2$, (head, hands, forearms) (EPA 1997) |
| AF | = | Adherence Factor, 0.8 $mg/cm^2$-day, The AF dataset for a utility worker was chosen because it represents a "typical" or central tendency activity for a utility worker. The 95$^{th}$ % AF of this dataset best approximates an RME scenario, (Kissel *et al.*, in press; EPA 1998) |
| $ABS_d$ | = | dermal absorption factor, 0.14 for PCBs (Wester *et al.*, 1993) |
| $ABS_o$ | = | GI absorption factor, 1 for PCBs (from PTI, 1993) |
| RfD | = | Reference Dose, 2 x $10^{-5}$ mg/kg/day (IRIS 1996) |
| CSF | = | Cancer slope factor for PCBs, 2 $(mg/kg\text{-}day)^{-1}$ (IRIS 1998) |
| C | = | Conversion, $10^{-6}$ kg/mg |

Substituting the above values into the equation for estimating noncancer risks:

$$HQ = \frac{200 \times 5 \times 25}{70 \times 9125} \left[ \frac{(1)}{2 \times 10^{-5}} \times \frac{(137 \times 1 \times 1)}{10^6} \right] + \left[ \frac{(1)}{2 \times 10^{-5}} \times \frac{(3300 \times 0.8 \times 0.14)}{10^6} \right]$$

$$HQ = \frac{25000\ [137/20 + 369/20]}{638750} = 0.9$$

Substituting the above values into the equation for estimating cancer risks:

$$ELCR = \frac{200 \times 5 \times 25 \times 2\ [(1 \times 137 \times 1) + (3300 \times 0.8 \times 0.14)]}{70 \times 25550 \times 10^6}$$

$$ELCR = \frac{50000\ [137+369]}{1788500 \times 10^6} = 1.4 \times 10^{-5}$$

**5. Current and Future Residential Property (0-15 foot depth)- 2 ppm**

A cleanup level of 2 ppm must be met in residential areas. The 2 ppm concentration is the MA DEP's generic Method 1 soil cleanup standard for residential use. We have relied on the Method 1 standard in determining the cleanup level. However, below we have also presented risk calculation to provide quantitative risk measurements. This level is protective for young children and adults who may be exposed to contaminated soil while playing in their yard or

while gardening or doing yard work. In evaluating risks associated with this cleanup level, it was assumed that residents are exposed to contaminated soil in their yard 5 days per week for 7 months of the year (May through November) when the ground is not frozen or snow-covered. Noncancer risks were evaluated for a young child aged 1-6. Cancer risks were evaluated for a resident aged 1-30 years. It was assumed that a child resident's head, lower arms, hands, lower legs and feet could be exposed to contaminated soil from May through September and that an adult resident's head, lower arms, hands and lower legs would be exposed. In October and November, both a child and adult resident's hands and face could be exposed. Dermal contact with soil and incidental ingestion of soil were considered.

The values used to calculate the risks are provided below.

**Estimated noncancer hazard associated with oral and dermal exposure to recreational soils**

$$HQ = C_s \times F \times D \left[\frac{1}{(BW_C \times AT_{nc})} \times \frac{IR_c \times FI \times ABS_o}{RfD_o \quad 10^6 mg/kg} + \frac{1}{RfD_o} \times \frac{[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7] \times ABS_d}{10^6 mg/kg}\right]$$

HQ = hazard quotient
$C_s$ = PCB concentration in soil, (i.e., cleanup level) (2mg/kg)
F = exposure frequency; (150dys/yr)=5dys/wk for 7mos/yr, (May-Nov); site-specific
D = duration;(child - 6 yrs); Site-specific
$IR_c$= soil ingestion rate for child 1-6; 200mg/dy; EPA, 1991
FI = fraction ingested from site; (1); site-specific
$ABS_o$= GI absorption fraction; (1); PTI, 1993
$SA_1$ = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 $cm^2$ ;EPA, 1997; Based on same information for noncancer calculations for a recreational child (see above).
$AF_1$ = overall skin adherence factor weighted by body-part exposed;
For child 1-6 = 0.24mg/$cm^2$ -event: See calculations for recreational child above.
$SA_2$= surface area for a child exposed during Oct thru Nov. = head and hands;
= 1340 $cm^2$ for 1-6 yr old
$AF_2$= overall skin adherence factor weighted by body part exposed from Oct thru Nov; 0.23mg/$cm^2$ (see calculation for a recreational child)
$ABS_d$ = dermal absorption fraction; (0.14), Wester et. al, 1993
BW = average body weight; 15 for 1-6yr old (EPA, 1997)
$AT_{nc}$ = averaging time, 6yrsx365dys/yr - (2190 dys); Site-specific
RfD = reference dose for Aroclor 1254 = $2x10^{-5}$ mg/kg-dy; IRIS, 1998
Substituting the values above into the equation:

$$THQ = \frac{2x\ 150\ x6}{[15x2190]} \left[\frac{(1\ x200\ x\ 1)}{2x10^{-5} \quad 10^6} + \frac{1}{2x\ 10^{-5}} \times \frac{[(2900x\ 0.24\ x\ 5) +(1340\ x0.23\ x\ 2))/7]x\ 0.14}{10^6}\right]$$

$$= \frac{1800(200}{(32850)\ 20} + \frac{81.9)}{20} = 0.055x\ 14 = 0.77 \text{ or } 0.8$$

**Estimated excess cancer risk associated with oral and dermal exposure to residential soils**

$$ELCR = \frac{C_s \times F\,[(CSF \times ABS_o \times IF_{adj}) + (SFS_{adj} \times CSF \times ABS_d)]}{AT_c \times 10^6\ mg/kg}$$

Where:.
ELCR = excess lifetime cancer risk
$C_s$ = PCB concentration in soil, (i.e., cleanup level) (2mg/kg)
F = exposure frequency; (150dys/yr)=5dys/w for 7mos/yr, (May-Nov); site-specific
CSF = cancer slope factor for PCBs $(2\ mg/kg\text{-}dy)^{-1}$ ; IRIS, 1998
$ABS_o$ GI absorption fraction; (1); PTI, 1993
$IF_{adj}$ = age- adjusted soil ingestion factor, equal to:

$$\frac{(FI)(IR_{1\text{-}6})(D_{1\text{-}6})}{BW_{1\text{-}6}} + \frac{(FI)(IR_{7\text{-}31})(D_{7\text{-}31})}{BW_{7\text{-}31}} = 80 + 34.28 = 114\ mg\text{-}yr/kg\text{-}dy$$

Where;
$IR_c$ = soil ingestion rate; child 1-6; 200mg/dy; child 7-31; 100mg/dy; EPA, 1991
FI = fraction ingested from site; (1); site-specific
BW = average body weight; 15 for 1-6yr old; 70 for 7-31 yr old; EPA, 1997,
D = duration;1-6yrs old -6 yrs; 7-31 yr old - 24yr; Site-specific

$SFS_{adj}$ = age-adjusted soil contact factor=

$$\frac{(D_{1\text{-}6})[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7]_{1\text{-}6}}{BW_{1\text{-}6}} + \frac{(D_{7\text{-}31})[((AF_1 \times SA_1 \times 5)+(SA_2 \times AF_2 \times 2))/7]_{7\text{-}31}}{BW_{7\text{-}31}}$$

$$= \frac{(6)[((0.24 \times 2900 \times 5)+(0.23 \times 1340 \times 2))/7]}{15} +$$

$$\frac{(24)[((0.1 \times 5700 \times 5)+(0.15 \times 2110 \times 2))/7]=}{70}$$

$$= \frac{6[(3480+616.4)/7]}{15} + \frac{24[(2850+633)/7]}{70} = 234.1+170.6 = 404.7$$

Where;
$SA_1$ = surface area of a child exposed during May thru Sept = head, hands, lower arms, lower legs and feet; for child 1-6 =2900 $cm^2$ (see above), for 7-31=5700 $cm^2$;EPA, 1997; Same assumptions and approach as in recreational calculations.
$AF_1$ = overall skin adherence factor weighted by body-part exposed;
For child 1-6 = 0.24mg/$cm^2$ -event( see recreational scenario above);
For 7-31:= 0.1mg/$cm^2$ -event Based on;

- used Kissel data listed in EPA, 1997 for gardeners. Used 50th percentile AFs which result in overall 50th percentile AF. Surface area based on 7-31 yr old

$AF_2$ = overall skin adherence factor weighted by body-part exposed; hands and face exposed
For child 1-6 = 0.23mg/$cm^2$ (see recreational scenario above)

$$AF_{2\,(7\text{-}31)} = \frac{(402)(0.053)+(904)(0.19)}{402+904} = 0.15\ mg/cm^2$$

$SA_2$= surface area for a child exposed during Oct thru Nov. = head and hands;
1340 $cm^2$ for 1-6 yr old; 2110 $cm^2$ for 7-31 yr old

$ABS_d$ = dermal absorption fraction; (0.14), Wester et. al, 1993
$ABS_d$ = dermal absorption fraction; (0.14),Wester et. al, 1993
$AT_c$ = averaging time, 70yrsx365dys/yr - (25550days); Site specific

Substituting the values above into the equation:

$$ELCR = \frac{2x150\ [(2x1x114) + (404.7x0.14\ x2)]}{(25550)(10^6 mg/kg)}$$

$$= \frac{300(228 + 113.3)}{25550x10^6} = \frac{102394.8}{25550x\ 10^6} = 4.0 \times 10^{-6}$$

The cleanup level of 2 ppm equates to a Hazard Quotient of 0.8 and an excess cancer risk of $4x10^{-6}$.

**6. Allendale School (0-15 feet) 2 ppm**

A cleanup level of 2 ppm has been chosen for Allendale School. This is the generic MCP Method 1 standard for PCB at residential properties. The assumptions and calculation would mirror those assumptions and calculations for the residential properties presented above. This cleanup level is also protective of the current use of this area (i.e. as a playground and sports field).

**References**

ChemRisk, 1997. Attachment A: Proposal for Alternative Input Values for the Human Health Risk Assessment for the Housatonic River, Attachment to Letter from Jane Magee, General Electric Co., to Bryan Olson, EPA and J. Lyn Cutler, DEP, September 11, 1997.

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**MEMORANDUM**

**DATE:** July 26, 1999

**SUBJECT:** Protectiveness of Cleanup Levels for Removal Actions Outside the River-Protection of Ecological Receptors

**FROM:** Susan C. Svirsky, Ecological Risk Assessor, USEPA, Region I

**TO:** Richard Cavagnero, GE Team Leader, USEPA, Region I
Tim Conway, Esquire

The purpose of this memorandum is to present an evaluation of the protectiveness of the cleanup levels (i.e. performance standards) for PCBs in soils and sediments referenced in the Action Memorandum for Removal Actions Outside the River at the GE-Housatonic River site, located in Pittsfield, MA. This screening-level evaluation of the protectiveness of the cleanup levels is based upon my assessment of habitat conditions and likelihood of exposure of ecological receptors to PCBs, and knowledge derived from ecological risk assessments performed for other Superfund sites. The response action goals that are evaluated in this memorandum have no applicability to the "Rest of River", i.e. the Housatonic River downstream of the 2 Mile Upper Reach, and the associated wetlands and floodplain. A detailed, site-specific ecological risk assessment will be performed for the Rest of River. This memorandum summarizes, by area, EPA's evaluation of the protectiveness of the cleanup levels for ecological receptors.

## GE Plant Site

Much of the area in the GE Plant Site is currently paved. Under the Action Memorandum, areas that are currently paved and have average PCB concentrations greater than 25 mg/kg in the top foot will have the pavement maintained or enhanced. This action will effectively eliminate exposure for terrestrial ecological receptors by eliminating any habitat and any direct contact with the contaminated soil.

In areas of the GE Plant site that are currently unpaved and have average PCB concentrations greater than 25 mg/kg in the top foot, the following response actions will be taken:

- in areas within the 100-year floodplain, the top foot of soil will be removed and replaced with one foot of clean soil;
- in areas outside the 100-year floodplain, a one foot soil cap will be placed over the contaminated soils.

Either of these approaches will eliminate most exposure. Habitat enhancement will not occur in

these areas, making it unlikely that ecological receptors would utilize these areas. Therefore, occasional transient use by ecological receptors would be acceptable at the average residual concentration of 25 mg/kg.

There is one exception, for a portion of the facility that constitutes an approximate 200-foot-wide strip along the Housatonic River between the former Thermal Oxidizer location and the downstream facility boundary. In this strip, the top foot of pavement/soil will be removed and replaced with clean soil. In addition, a vegetative engineered barrier will be placed in the area except in any locations where the average PCB concentrations in soil do not exceed 10 mg/kg in the top foot (which will be achieved due to clean backfill), 15 mg/kg in the 1 to 3 foot depth increment, and 100 mg/kg in the top fifteen feet. This area will then be vegetated in accordance with the Natural Resource Damage (NRD) project requirements.

The purpose of this project is to enhance the riparian habitat and to decrease overland runoff from the facility into the Housatonic River, both objectives having a positive benefit to the ecological receptors in and using habitat adjacent to the river. Upon completion of this aspect of the project, habitat for ecological receptors using this portion of the river corridor will be enhanced. The placement of a top one foot layer of clean soil, together with either placement of a vegetative engineered barrier or the achievement of 15 mg/kg in the 1 to 3 foot depth increment, is expected to eliminate exposure to non-burrowing terrestrial receptors, and to significantly reduce the exposure to those receptors that may burrow greater than one foot (such as skunks, woodchucks, racoons, and members of the weasel family) into the soils. These actions are expected to be fully protective for the local subpopulation of an ecological receptor including those deeper burrowing species, without additional precautions for risk reduction.

For the portion of the 200-foot-wide strip along the river from Newell Street downstream to the former location of the Thermal Oxidizer, soils will be removed to achieve a 25 mg/kg average in the top foot. The habitat within this area will not be enhanced as part of an NRD project, therefore it is not anticipated that the area will be highly attractive to terrestrial ecological receptors but may be marginally more attractive than the remaining industrial property, particularly for animals that utilize riparian habitats, because of the proximity to the river. Therefore, in restoring this area, structures such as stumps and rock piles will be placed to provide alternative den sites, thereby further reducing the likelihood for burrowing if the animals do utilize the area. These actions are expected to be fully protective for the local subpopulation of an ecological receptor including those deeper burrowing species, without additional precautions for risk reduction.

**Former Oxbow Areas - Other Riparian Areas - GE-owned Parking Lots**

For the GE-owned Newell Street and Lyman Street parking lots, GE will be required to remove the top foot of pavement/soil and replace that material with a one-foot vegetative engineered barrier, except that upon EPA approval and subject to certain conditions: (a) the one foot

engineered barrier may be installed over the existing ground surface; and/or (b) a barrier need not be installed in any locations where the average PCB concentrations in soil do not exceed 10 mg/kg in the top foot, 15 mg/kg in the one to three foot depth interval, and 100 mg/kg in the top 15 feet. In addition, for the wooded area at Newell Street II and the GE-owned riparian strip at Newell Street I, response actions will consist of either: (a) removal and replacement of soils to achieve average PCB concentrations of 10 mg/kg in the top foot and 15 mg/kg in the 1 to 3 foot depth interval plus an engineered barrier if residual PCB concentrations exceed 100 mg/kg in the top 15 feet; or (b) removal of the top foot of soil and installation of a vegetative engineered barrier in portions of the areas until the average PCB concentrations in the remaining portions achieve the above levels.

These areas areas are larger than the 200-foot-wide riparian strip mentioned above and also lie adjacent to the river. The above-described response actions are expected to reduce exposure and protect ecological receptors for similar reasons discussed above for the downstream portion of the 200-foot strip and discussed below for recreational properties at the former oxbows.

**Former Oxbow Areas - Commercial/Industrial Properties**

The Action Memorandum requires that pavement be enhanced or soils in the top foot removed to achieve a 25 mg/kg PCB average. These properties do not provide desirable habitat for ecological receptors due to their commercial/industrial development and ongoing use. Therefore the required actions will be protective of ecological receptors as there will be little or no exposure except of a transient nature.

**Former Oxbow Areas - Recreational Properties**

These properties will have 1 foot of soil removed and replaced with clean soil to achieve a spatial average of 10 mg/kg PCBs in the top foot and 15 mg/kg PCBs in the 1 to 3 foot interval. These actions are expected to be fully protective for ecological receptors, including those deep burrowing species, without additional precautions for risk reduction.

**Residential Properties**

All residential properties will be cleaned up to a 2 mg/kg average concentration of PCBs in soil. Some of these residential properties will contain habitat likely to support a wide range of ecological receptors. The cleanup required on these properties will be adequate to eliminate risk to ecological receptors with unlimited exposure.

**Unkamet Brook Area**

The Unkamet Brook Area consists of four subareas: Unkamet Brook itself, the Unkamet Brook Landfill, Unkamet Brook inundated wetlands, and potential recreational areas in the floodplain of Unkamet Brook The brook runs through the center of the landfill under the current

configuration. The response called for in the Action Memorandum requires the brook to be rerouted back to the approximate original channel, thereby bypassing the landfill. Secondly, the landfill will be capped in its entirety, with a paved engineered barrier on the currently paved portion of the former landfill and a landfill cap on the unpaved portion. The third component includes the removal of brook sediments to achieve an average of 1 mg/kg PCBs in the top foot, and removal or capping of the remaining inundated wetland sediments to also achieve the 1 mg/kg PCB average in the top foot. The fourth and final piece is to remove soils in the remainder of the Unkamet Brook recreational floodplain areas to achieve 10 mg/kg in the top foot and 15 mg/kg in the 1 to 3 foot depth interval.

Rerouting the brook will have the beneficial effect of eliminating erosion within the landfill during high flow events when the brook floods. It will also restore some meander to the brook which had been previously removed. Capping of the landfill (as described above) and contaminated inundated wetland sediments will eliminate direct exposure and will result in an altering the habitat away from an aquatic system towards a terrestrial system (mitigation for the expected wetland loss associated with this action has been included under the NRD component of the proposed settlement).

With the relatively high organic carbon content of the wetland system, brook sediments and inundated wetland soils that, on average, achieve 1 mg/kg total PCBs in the top foot, are expected to be protective of the vast majority of aquatic receptors. If the area designated as recreational floodplain remains in its current wetland community type, then it is expected that, given the cleanup levels in that area, ecological receptors will not be adversely impacted in this area. In the event that non-inundated areas of the wetland system become inundated wetlands, the cleanup levels would need to be reviewed for protectiveness.

**Silver Lake**

The Silver Lake Removal Action is defined in the Action Memorandum with two components. The first is the response action for the nearshore environment, where the bank soils will be removed to achieve a 10 mg/kg average in the first foot, and 15 mg/kg average in the 1 to 3 foot interval. The second component includes capping the entire lake bottom, armoring the cap along the shoreline, and removing selected sediments near the outfall and capping and revegetating that area as proposed in the NRD project.

The residual bank concentrations are expected to be protective of terrestrial receptors. The sub-aqueous cap will utilize best available techniques that are feasible from an engineering perspective to prevent aquatic receptors from contact with and thereby eliminate exposure to the underlying contaminated sediments, and also to minimize the migration of contaminants from the underlying sediments into the water column to meet response goals to protect aquatic receptors.

# Appendix A

**Administrative Record Index**
GE - Housatonic River Site
Removal Actions Outside the River
August 1999

1. *MCP Interim Phase II Report for the Newell Street Site, Volume I of IV*, by Blasland, Bouck & Lee, February 1992.

2. *MCP Phase I Report for Lyman Street Parking Lot (Oxbow Area D) and Current Assessment Summary for USEPA Area 5A. Volumes I, II, III and IV*, Blasland, Bouck & Lee, Inc., February 1994.

3. *MCP Interim Phase II Report and Current Assessment Summary for East Street Area 2/USEPA Area 4. Volumes I, II, III, IV, V, VI, VII, IX, X*, Blasland, Bouck & Lee, Inc., August 1994.

4. *MCP Interim Phase II Report and Current Assessment Summary for East Street Area 1/USEPA Area 3. Volumes I, II, III and IV*, Blasland, Bouck & Lee, Inc., October 1994.

5. *MCP Interim Phase II Report and Current Assessment Summary for Unkamet Brook Area/USEPA Area 1, Volumes I through XIV*, Blasland, Bouck & Lee, Inc., January 1995.

6. *Phase I Report (MCP)/Current Assessment Summary, Hill 78 Area/USEPA Area 2*, O'Brien & Gere Engineers, Inc., May 1995.

7. *MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation of East Street Area 2/USEPA Area 4*, Blasland, Bouck, & Lee, Inc., July 1995.

8. Letter from Jeffrey G. Ruebesam, General Electric Company, to Mr. David A Slowick, Massachusetts DEP, Re: *Release Notification RTN 1-10900, Pittsfield East Street Area 2, Tier 1A Site 1-0146, Monitoring Well 5* (including attachments), July 13, 1995.

9. *Supplemental Phase II/RCRA Facility Investigation Report for Housatonic River and Silver Lake*, Blasland, Bouck, & Lee, Inc., January 1996.

10. *MCP Phase I and Interim Phase II Report for Former Housatonic River Oxbow Areas A, B, C, J, and K (Vol. I and II)*, Blasland, Bouck, & Lee, Inc., February 1996.

11. Letter (including attachments) from Richard W. Gates, GE to Ms. J. Lyn Cutler, Massachusetts DEP and Mr. Bryan Olson, EPA, Re: *Pittsfield 1-1057, USEPA Area 5B, GE/Newell Street Area II- Phase II/RFI Data and Boring Logs*, May 10, 1996.

12. *MCP Supplemental Phase II/RCRA Facility Investigation Report for Lyman Street/USEPA Area 5A Site*, Blasland, Bouck & Lee, Inc., June 1996.

13. *Addendum to MCP Supplemental Phase II Scope of Work and Proposal for RCRA Facility Investigation for East Street Area 1/USEPA Area 3*, Golder Associates and Blasland, Bouck, & Lee, November 1996.

14. Pages 1 through 17 of analytical data from Alpha Analytical Laboratories, Client: GE Company; Laboratory Job Number: L9608547; and attached BBL Chain-of-Custody Form signed November 13, 1996.

15. Letter from GE to the Massachusetts DEP *RE: Request for Information regarding Properties That May Have Received Fill from the General Electric Facility in Pittsfield*, November 27, 1996.

16. First Unilateral Administrative Order for Removal Action, U.S. EPA Region I CERCLA Docket No. I-97-1003, In the Matter of: GE Building 68 Site, Pittsfield, Massachusetts, signed by Linda M. Murphy on December 18, 1996.

17. *MCP Phase II/RCRA Facility Investigation Report for Hill 78 Area/USEPA Area 2, Vol. I*, Blasland, Bouck & Lee, Inc., August 1997.

18. Letter from Jane Magee, General Electric Co., to Bryan Olson, EPA and J. Lyn Cutler, DEP, Re: *DEP #1-0147P; EPA Area 6, Housatonic River: Human Health Risk Assessment* (Including Attachment A: Proposal for Alternative Input Values for the Human Health Risk Assessment for the Housatonic River, by ChemRisk), September 11, 1997.

19. *Addendum to MCP Supplemental Phase II/RCRA Facility Investigation Proposal for Lyman Street/USEPA Area 5A Site*, Blasland, Bouck & Lee, Inc., October 1997.

20. *Immediate Response Action Completion Report, Oxbow Area C*, Blasland, Bouck, & Lee, Inc., December 1997.

21. *Report on Supplemental Characterization Activities - Building 68 Area, Draft*, by Blasland, Bouck, & Lee, Inc, February 1998.

22. *Upper Reach - Housatonic River Ecological Risk Assessment*, Roy F. Weston, Inc., May 1998.

23. Memorandum from Mary Ballew, EPA, and Margaret Harvey, Massachusetts DEP, Subject, *Evaluation of Human Health Risks from Exposure to Elevated Levels of PCBs in Housatonic River Sediment, Bank Soils and Floodplain Soils in Reaches 3-1 to 4-6 (Newell Street to the confluence of the East and West Branches)*, May 14, 1998.

24. Memorandum from Dean Tagliaferro, EPA to Patricia L. Meaney, EPA, Subject: *Request to Conduct a Removal Action at the GE-Housatonic River Site ("Upper Reach Removal Action"), Pittsfield, Massachusetts—Combined Action and Engineering Evaluation/Cost Analysis ("EE/CA") Approval Memorandum*, May 26, 1998.

25. Letter from Andy Silfer, GE to Ms. J. Lyn Cutler, Massachusetts DEP, and Mr. Bryan Olson, EPA, RE: *DEP Site No. 1-0147/EPA Area 6, Floodplain Soil Sampling*), September 11, 1998.

26. *Site Investigation Report for General Electric Unkamet Brook Sampling Project, Pittsfield, Massachusetts*, Roy F. Weston, Inc., October 1998.

27. *Source Control Investigative Report, Upper Reach of Housatonic River (First ½-Mile)*, HSI Geotrans, February 9, 1999.

28. *DNAPL Assessment, East Street Area 2 Site*, HSI Geotrans, April 28, 1999.

29. *Source Control Investigation Addendum Report, Upper Reach Housatonic River (First ½ Mile)*, HSI Geotrans, June 15, 1999.

30. Memorandum from Richard Cavagnero, EPA to John P. DeVillars, EPA, Subject: *Request for a Removal Action at the Allendale School, GE–Pittsfield/Housatonic River Site, Pittsfield, Massachusetts–Action Memorandum*, July 12, 1999.

31. Letter (including attachments) from John D. Ciampa, GE to Ms. J. Lyn Cutler, Massachusetts DEP and Mr. Bryan Olson, EPA, Re: *General Electric Pittsfield Facility: Hill 78Site/USEPA Area 2 (Massachusetts DEP File #1-0714, Release Tracking #1-12954)*, July 19, 1999.

32. Memorandum from Richard Cavagnero, EPA to John P. DeVillars, EPA, Subject: *Request for Removal Actions Outside the River at the GE–Housatonic River Site, Pittsfield, Massachusetts–Action Memorandum*, August 4, 1999.

# Appendix B

**Index of Selected Key Guidance Documents**
GE - Housatonic River Site
Additional Removal Actions Outside the River
August 1999

EPA guidance documents may be reviewed at the EPA Region I's Superfund Records Center, 1 Congress Street, Boston, Massachusetts.

1. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. § 9601 et seq. January 1, 1980 [C018]

2. "Polychlorinated Biphenyls Spill Cleanup Policy", Federal Register. April 2, 1987. Vol. 52, No. 63 p. 10688-10710. [C069]

3. U.S. Environmental Protection Agency. Office of Solid Waste and Emergency Response. Environmental Review Requirements for Removal Actions (OSWER Directive 9318.0-05), April 13, 1987. [1003]

4. "Determining When Land Disposal Restrictions (LDRs) are Applicable to CERCLA Response Actions" (OSWER Directive 9347.3-05FS), July 1989. [2218]

5. "National Oil and Hazardous Substances Pollution Contingency Plan; Final Rule", Federal Register. March 8, 1990. Vol. 55, No. 46, pp. 8758-8760. [C496]

6. Guidance on Remedial Actions at Superfund Sites with PCB Contamination. (OSWER Directive 9355.4-01) August 1, 1990. [2014]

7. Guidance on Remedial Actions at Superfund Sites with PCB Contamination. Quick Reference Fact Sheet (OSWER Directive 9355.4-01FS) August 1, 1990. August 1, 1990. [C254]

8. Superfund Removal Procedures Action Memorandum Guidance. (OSWER Directive 9360.3-01), September 1, 1990. [C263]

9. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response. Washington, DC. OSWER Directive 9285.6-03. March 25, 1991 [C219]

10. "Role of Baseline Risk Assessment in Superfund Remedy Selection Decisions", Don Clay. April 22, 1991 (OSWER Directive 9355.0-30) [C276]

11. Superfund Removal Procedures: Guidance on the Consideration of ARARs During

Removal Actions. (OSWER Directive 9360.3-02), August 1, 1991. [C183]

12. Superfund Removal Procedures: Public Participation Guidance for On-Scene Coordinators: Community Relations and the Administrative Record. (OSWER Directive 9360.3-05), June 1, 1992. [C285]

13. "Soil Remediation Goals for Sprague Electric Brown Street Site, North Adams, MA," Geraghty and Miller, Inc., June 3, 1992. [C494]

14. "Early Action and Long-term Action Under SACM (Superfund Accelerated Cleanup Model) - Interim Guidance." (OSWER Directive 9203.1-051), December 1, 1992. [C185]

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